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The Great Basin Naturalist

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NEW SPECIES OF BARK BEETLES (COLEOPTERA: SCOLYTIDAE), MOSTLY MEXICAN. PART V

Stephen L. Wood[1]

In this paper five new species of scolytid beetles are described as new, one in the genus *Pseudopityophthorus* Swaine, from Mexico, and four in the genus *Dendroterus* Blandford, from Mexico and Texas. In addition, three species of *Pseudopityophthorus* known previously from the United States are recorded from Mexico for the first time. Seven of the eight species reported here were collected by the writer while with the 1953 expdition of the Francis Huntington Snow Entomological Museum (University of Kansas, Lawrence), the eighth species was received from the U. S. National Museum.

Pseudopityophthorus Swaine

Pseudopityophthorus pulverulus Blackman.—Collected 30 miles southwest of El Salto, Durango, Mexico, on July 23, 1953, 8400 feet, from *Quercus* sp., by S. L. Wood; and 14 miles northeast of Nochixtlan, Oaxaca, Mexico, on July 5, 1953, 6700 feet from Quercus sp., by S. L. Wood.

Pseudopityophthorus yavapaii Blackman.—Taken 15 miles northwest of Chihuahua, Chihuahua, Mexico, on July 29, 1958, from *Quercus* sp., by S. L. Wood.

Pseudopityophthorus opaciollis Blackman.—Collected 35 miles southwest of El Salto, Durango, Mexico, on July 23, 1953, at an elevation of 8400 feet, from *Quercus* sp., by S. L. Wood.

Pseudopityophthorus tenuis, n. sp.

This species is very similar to *asperulus* (Leconte), differing principally by the absence of a transverse impression on the lower half of the frons, in the male by the presence of a small brush of hair on the upper part of the head, and in the female by the presence of a small, sharply elevated median carina.

Male.—Length 1.3 mm., 3.0 times as long as wide; body color black.

Frons flattened, gradually elevated toward epistomal margin;

1. Zoology and Entomology Department contributions No. 105, Brigham Young University, Provo, Utah. Scolytoidea contribution No. 17.

surface finely punctured; vestiture consisting of a sparse epistomal brush, a few fine setae on lower lateral margin of frontal area, and about a dozen (two dozen in one paratype) coarse long setae on median third above upper level of eyes. Eye and antennae as in *asperulus*.

Pronotum and elytra as in *asperulus*, except the punctures of elytral striae even more strongly reduced.

Female.—Similar to male except: frons with a very narrow median carina beginning at upper level of eyes and extending a third of the distance to epistomal margin; the transverse impression and median prominence on lower third of frons present in *asperulus* absent in this species.

Type Locality.—Eleven miles northeast of Jacala, Hidalgo, Mexico.

Host.—*Quercus* sp.

Type Material.—The male holotype, female allotype and 11 paratypes were collected at the type locality on June 22, 1953, at an elevation of 5100 feet by S. L. Wood. These specimens were taken from the same branch as *Micracisella knulli* (Blackman) and *Micracis truncatus* Wood.

Dendroterus Blandford

Dendroterus Blandford, 1904, Biologia Centrali-Americana 4(6):233; Hopkins, 1914, Proc. U. S. Natl. Mus. 48:120 (type designated).

Plesiophthorus Schedl, 1940, Ann. Escuela Nacional de Ciencias Biologicus (Mexico) 1:243 (new synonymy).

The genus *Dendroterus* was established to include two monotypic Mexican species, *mexicanus* from Tehuantepec, Oaxaca, and *sallei* from Vera Cruz, V. C. All subsequent references to the genus are to Blandford's two specimens. Hopkins (1914) designated *mexicanus* as the type species. Schedl's monobasic genus *Plesiophthorus* was based on a single specimen from Omilteme, Guerrero, named *perspecus;* since then *luteolus* Schedl, *californicus* Schedl, and *striatus* (Leconte) all from California and Baja California, have been added. The principal means of distinguishing the two genera has been the segmentation of the antennal funicle; it was considered to be four segmented in *Dendroterus* and three segmented in *Plesiophthorus*. Examination of three of the described *Plesiophthorus* and the four additional species presented below indicates that segmentation of the funicle is variable and cannot be relied upon to separate species, not to mention its use as a generic character. Blandford also referred to the difficulty of distinguishing funicular segmentation "even with a high magnification."

Generally speaking the funicle is three segmented, however, in two of the species described below, *decipiens* and *confinis*, some of the specimens (usually females) may have four, or in one case five, distinct segments. All degrees of fusion of the third and fourth segments can be seen. In one instance a female with only three segments had the second and third partly fused along one side. In view of the variability of this feature and the wide range of characters

exhibited in species of this group, it is necessary to place the name *Plesiophthorus* Schedl in synonymy under the older name *Dendroterus* Blandford.

Dendroterus mundus, n. sp.

This species is very similar to *striatus*, *californicus* and *luteolus* in the general sculpture of pronotal disc and elytral declivity, in the type of vestiture, and in the sexual differences of the frons. It differs, however, in the smaller size, in the more strongly convex lower half of the male frons and the more strongly convex female frons with a corresponding less strongly impressed area below the transverse carina, and in having the declivital interstrial punctures subequal to those of the striae.

Male.—Length 1.7 mm., 2.6 times as long as wide. Body color light brown.

Frons strongly, evenly convex above epistoma and from eye to eye, coarsely closely granulate-punctate to upper level of eyes, sparsely punctured above this level; pubescence rather sparse, short, and coarse. Eye deeply emarginate; finely granulate. Antennal funicle three-segmented, pedicle longer than combined lengths of segments two and three; club large, about twice as long as funicle, almost circular in outline, the sutures straight except recurved at extreme side margins.

Pronotum 1.2 times as long as wide; sides straight and subparallel on posterior two-thirds, anterior margin rather broadly rounded and armed by about twelve coarse, low, subcontiguous teeth; summit indefinite, located at center; asperities coarser on anterior third, gradually blending into the granulate posterior areas of disc; posterolateral areas almost smooth and shallowly, coarsely punctured; the fine, raised lateral and posterior lines not present. Pubescence hairlike, short, suberect.

Elytra 1.5 times as long as wide; the sides straight and subparallel on basal three-fourths, abruptly, very broadly rounded behind; striae not impressed except the first, the punctures rather coarse and deep; interstriae narrower than striae, the punctures in more or less uniseriate rows, very close, about half the diameter of those of striae, distinctly impressed. Declivity rather steep, flattened; striae narrower than on disc, one, two and part of three impressed, the punctures much smaller and less definite; interspace one slightly elevated, one, two and lower part of three convex, the punctures subequal to those of striae and in less definite rows than on disc. Vestiture rather abundant, short; consisting of fine semierect strial hairs and slightly longer and coarser erect interstrial setae; not longer on declivity, very slightly longer on sides.

Female.—Similar to male except: frons with a broad, arching carina at upper level of eyes.

Type Locality.—Tehuitzingo, Puebla, Mexico.

Host.—Unknown tree.

Type Material.—The male holotype, female allotype and 11

paratypes were collected at the type locality on July 13, 1953, at an elevation of 3700 feet; and six paratypes were taken at Matamoros, Puebla, Mexico, on July 3, 1953, at an elevation of 3700 feet, by S. L. Wood. In both cases the specimens were taken from star-shaped galleries in the cambium region of large, cut limbs of a broadleaf tree. One additional paratype was taken at light at Ocosingo Valley, Chiapas, Mexico, on July 27, 1950, by L. J. Stannard.

The holotype, allotype and some paratypes are in the Snow Entomological Collection; other paratypes are in the U. S. National Museum and the collection of the writer.

Dendroterus texanus, n. sp.

This species is quite different from other known species in the genus. It is distinguished by the absence of secondary sexual characters on the frons, and by the smooth surface of the pronotal disc between the coarse punctures.

Male.—Length 2.7 mm., 2.8 times as long as wide; body color dark brown.

Frons rather weakly convex from eye to eye, epistomal margin gradually elevated; surface almost smooth with rather coarse, abundant subgranulate punctures; vestiture sparse, short, hairlike. Eye deeply emarginate; finely granulate. Antennal funicle three segmented, the pedicle almost equal in length to the combined lengths of segments two and three; club oval, the sutures straight except recurved at extreme side margins.

Pronotum 1.1 times as long as wide; widest at base, the sides feebly arcuate and converging very slightly toward the rather narrowly rounded anterior margin; anterior margin armed by eight rather large, subcontiguous teeth, the median ones slightly longer; summit near middle, indefinite; surface of disc very minutely reticulate between the coarse, deep, abundant punctures, posterior areas devoid of granules; lateral and basal lines not present. Vestiture fine, semierect, hairlike, of moderate length.

Elytra 1.7 times as long as wide; sides straight and subparallel on basal two thirds, gradually, rather narrowly rounded behind; striae not impressed, the punctures rather coarse, deep; interstriae as wide as striae, almost smooth, the punctures fine, about equal in number to those of striae. Declivity moderately steep, convex; striae one and two slightly impressed, the punctures greatly reduced in size, but deeply and distinctly impressed; interspace one slightly elevated, the punctures as on disc but some very feebly granulate. Vestiture consisting of minute, inconspicuous strial hairs, and moderately long, erect interstrial hairlike setae; not longer on declivity.

Female.—Similar to the male; distinguished externally only by the segmentation of the abdomen.

Type locality.—Presidio, Texas.

Host.—Jatropha spathulata.

Type Material.—The male holotype, female allotype and 116

paratypes were collected at the type locality on May 16, 1947, from *Jatropha spathulata*, by J. H. Russell.

The holotype, allotype, and some paratypes are in the U. S. National Museum; other paratypes are in the collection of the writer.

Dendroterus decipiens, n. sp.

This species evidently is allied to *mexicanus* Blandford as evidenced by the pubescent frons and by the occasionally four segmented funicle of the female; however, it is smaller, lacks the raised median line on the pronotal disc and has rather different sculpturing on the elytral declivity.

Male.—Length 1.8 mm., 2.5 times as long as wide; body color very dark brown.

Frons evenly, rather strongly convex from eye to eye, although somewhat flattened along the bisinuate epistomal margin; surface almost smooth between rather coarse, close, moderately deep punctures; pubescence scanty except along epistomial margin. Eye deeply emarginate; finely granulate. Antennal funicle evidently four-segmented, the pedicle equal to combined lengths of segments two to four; club subcircular, the sutures straight, except recurved at the extreme side margins.

Pronotum 1.1 times as long as wide; widest just behind middle, the sides weakly arcuate, anterior margin rather broadly rounded and armed by ten coarse, subcontiguous teeth; summit at center, indefinite; anterior asperate region gradually blending into the coarsely, closely granulate posterior area on disc, almost smooth between rather coarse, close, deep punctures in posterolateral areas; lateral and basal lines absent. Vestiture semierect, hairlike, of moderate length.

Elytra 1.4 times as long as wide; sides straight and subparallel on basal three-fourths, rather abruptly, very broadly rounded behind; striae not impressed except the first, the punctures rather small, distinct but not deep; interstriae wider than striae, smooth, the punctures almost as large as those of striae and slightly less numerous and less distinctly impressed. Declivity very steep; interstriae two flat, rather strongly impressed, one and three slightly elevated and armed by several moderately large granules, a few smaller granules in lateral areas; striae not impressed, the punctures reduced in size. Vestiture consisting of fine, rather short, recumbent strial hair, and longer, erect, rather coarse interstrial setae, perhaps coarser but not longer on declivity.

Female.—Similar to male except: frons flattened from eye to eye, more finely, closely punctured and ornamented by a brush of long, fine incurved yellow setae, those at center of brush somewhat shorter; antennal funicle variable (usually) four-segmented; and second declivital interspace bearing a few minute granules.

Type Locality.—Three miles northwest of Tequila, Jalisco, Mexico.

Host.—Unknown tree.

Type Material.—The holotype, allotype and eight paratypes were collected at the type locality on July 19, 1953 at an elevation of 4000 feet, by S. L. Wood. They were taken from star-shaped gallery systems in the cambium region of a cut tree in a semi-desert region; they were associated with *Schedlarius mexicanus.*

The holotype, allotype and some paratypes are in the Snow Entomological collection, other paratyps are in the collections of the U. S. National Museum and of the writer.

Dendroterus confinis, n. sp.

This species evidently is very closely allied to *mexicanus.* It is of the same size and the female fits the very general description of *mexicanus* in most respects; however, it lacks the pronotal elevation and the declivity is not vertical nor strongly punctured.

Male.—Length 2.5 mm., 2.5 times as long as wide, body color almost black.

Frons strongly convex from eye to eye above epistomal margin; a large transverse epistomal elevation just above epistomal brush, almost obsolete on median third, strongly and abruptly elevated in lateral areas; surface coarsely granulate-punctate; vestiture fine and inconspicuous except along epistomal margin. Eye deeply emarginate; finely granulate. Antennal funicle three-segmented, the pedicle about equal to combined lengths of segments two and three; club subcircular, the sutures straight.

Pronotum 1.1 times as long as wide; widest at middle, the sides feebly arcuate, rather broadly rounded in front; anterior margin armed by ten poorly developed teeth; summit at center, indefinite; the surface rather coarsely, closely punctured immediately behind summit, gradually becoming coarsely granulate toward basal and lateral areas. Vestiture fine, short, semierect, hairlike.

Elytra 1.4 times as long as wide; sides almost straight and subparallel on basal three-fourths, abruptly, very broadly rounded behind; striae not impressed, the punctures moderately coarse, deep; instrstriae wider than striae, surface smooth, the punctures about two-thirds as large as those of striae and slightly less abundant. Declivity very steep; interspace two moderately impressed, one moderately, three very feebly elevated; strial and interstrial punctures reduced in size and depth, and of about equal size. Vestiture of small fine curved strial hair, and rows of longer, rather coarse, erect interstrial setae; not longer on declivity.

Female.—Similar to male except: frons flattened below upper level of eyes, more finely, closely granulate, and ornamented by a brush of rather long yellow hair; and the transverse epistomal elevation absent.

Type Locality.—Fourteen miles northwest of Magdalina, Jalisco, Mexico.

Host.—Unknown tree.

Type Material.—The male holotype, female allotype, and eleven paratypes were collected at the type locality on July 19, 1953 at an

elevation of 3500 feet, by S. L. Wood. The beetles were collected from star-shaped galleries in the cambium region of the ten-inch bole of the host tree. The uprooted tree had reddish peeling bark; the leaves were compound with three leaflets in each leaf.

The holotype, allotype and some paratypes are in the Snow Entomological Museum, other paratypes are in the collections of the U. S. National Museum and of the writer.

NOTES ON THE GENUS *LORDOTUS* LOEW, WITH DESCRIPTIONS OF NEW SPECIES (DIPTERA: BOMBYLIIDAE)[1]

D. Elmer[2] and Lucile Maughan Johnson

Since the publication of Hall's[3] admirable revision of the genus *Lordotus* Loew, a considerable amount of new material and much information has become available to the writers. Loans of specimens from the Universities of Arizona and Kansas, and visits to the California Academy of Science and the U. S. National Museum have been particularly fruitful. A study of the types of *Lordotus apicula* Coquillett, *L. junceus* Coq., *L miscellus* Coq., and *L. sororculus* Williston in the latter institution has helped settle some problems with these species that long have plagued us. We wish to express our gratitude to the men of the above-named institutions for their considerate aid and cooperation.

In this paper ten species and subspecies are named and described as new to science, the status of the two subspecies of *Lordotus gibbus* Loew in Utah is discussed, and the known ranges of four described species of this genus are materially extended. As noted below, the types of the new species and subspecies are deposited in the Snow Entomological Museum, the California Academy of Science, and our own collection which at the present time is at the Brigham Young University, Provo, Utah.

Lordotus Loew

The historical background of the taxonomy of this genus is well documented in Hall's paper (Ibid p. 1). Heretofore, some consideration has been given to the possibility that the genus *Lordotus* Loew may not represent a completely homogenous group of species. Coquillett[4] recognized one group of two species which differed morphologically from the others, and erected the genus *Geminaria* to receive them. Hall divided the genus into two groups, which he did not name, on the basis of wing color, placing those species with infuscated wings into one, and those with hyaline wings into the other. However, in even those species having the most heavily infuscated wings, little color is present; and in some instances it would be difficult to determine into which group a given species should be placed. For instance, we have Arizona specimens of *L. albidus* Hall, a supposedly hyaline-winged species, in which there is more color in the wing than in some specimens we have of *L. bucerus* Coq. and *L. ermae Hall*, which species supposedly have infuscated wings. Too, there are instances wherein very closely related species would be separated by wing color into opposite groups. We have a species

1. This study was supported in part by the U. S. Army Chemical Corps Contract No. DA-18-064-CML-2639, with the University of Utah, Ecological Research Contribution No. 31.

2. Associate Entomologist, Ecological Research, University of Utah, Dugway, Utah.

3. Hall, Jack C., 1954. A revision of the genus *Lordotus* Loew in North America (Diptera: Bombyliidae). Univ. of Calif. Pub. in Ent. 10 (1):1-34. 24 figs in text 4 maps.

4. Coquillett, D. W. 1894. Notes and descriptions of North American Bombyliidae. Trans. Amer. Ent. Soc., 21:89.

with hyaline wings which is obviously closely related otherwise to *L. gibbus* Loew, which species has the most heavily infuscated wings in the genus. We feel, therefore that wing color, useful though it may be in the differentation of individual species, is inadequate, at least in some instances, to be used as the sole criterion on which to base a grouping of the species, and that some other character or combination of characters must be used to show the relationships that exist in this genus of flies.

By using a combination of antennal, wing, and vestiture characteristics, the species of the genus can be resolved into three more or less well defined groups.

Key to the groups of the genus *Lordotus*

1. Antennae with a terminal style ..... *miscellus* group
   Antennae without terminal style 2
2. Costa of male denticulate; sexes frequently differing in color ..... *gibbus* group
   Costa of male not denticulate; sexes usually concolorous ..... *apicula* group

apicula group

This group is characterized by the lack of an antennal style and by the lack of denticulations on the male costa. Usually the ground color and the color of the vestiture is about the same in both sexes. None of the species bear conspicuous cross bands of dark pile on the abdomen in either sex.

The species and sub-species included in this group are: *abdominalis* Johnson and Johnson, new species; *apicula* Coquillett; *arnaudi* Johnson and Johnson, new species; *bipartitus* Painter; *divisus* Cresson; *ermae* Hall; *hurdi* Hall; *junceus* Coquillet; *lutescens* Johnson and Johnson, new species; *perplexus* Johnson and Johnson, new species; *planus* Osten Sacken; *puella* Williston; *sororculus sororculus* Williston; *sororculus nigriventris* Johnson and Johnson, new subspecies.

Lordotus abdominalis, n. sp.

Black; wings hyaline, not denticulate in male; pile of abdominal dorsum mixed black and white. Length 4.5-7 mm.

Male.—Oral margin dark gray, rest of head black; vestiture of head wholly black, the pile relatively short and sparse, the tomentum consisting of a few hair-like scales on lower occiput. First segment of antenna about two and one-half times as long as wide; second segment slightly wider, about as long as wide; third segment about one and one-third times as long as first two combined, somewhat wider than second segment, widest at basal third, sides of apical third almost parallel. Proboscis about two-fifths as long as body; palpi about one-sixth as long as proboscis.

Thorax very faintly grayish pollinose, ground color of pleura

somewhat brownish; short sparse pile of mesonotum white, black along margins, bristles black; sparse vestiture of pleura black, that of scutellum black on margins, gray on disk.

Wings hyaline, not denticulate; veins yellow at base and along costal region, otherwise dark blackish gray; costal pile and tomentum black. Squamae gray, pile white. Halteres yellow, knobs nearly white.

Legs dark brown to black, very narrowly paler at knees; vestiture dark brown to black.

Pile of abdominal dorsum white, that of sides of first and anterior angles of second black shading above to white. Ground color of first sternite gray, of first fourth of second and hind margins of second to fourth nearly white; pile of venter sparse, mostly black and dark gray, a few nearly white hairs intermixed. Genitalia brownish, pile pale yellow.

Female.—Only casually like male. Face and upper front shining black, lower front faintly and occiput moderately gray pollinose. Front and occiput moderately white tomentose; pile of front brownish yellow, narrowly black along lower margin and orbits, that of upper occiput yellow fading to white posteriorly; rest of pile of head black. Antennae almost evenly tapering from base to apex.

Mesonotum moderately white tomentose, that in middle being less dense. Sparse pile nearly white, yellow at sides; bristles yellow. Scutellum with sparse white tomentum and yellow pile and bristles, devoid of pollen. Pleura lightly gray pollinose; tomentum nearly white; pile mostly yellow, that on pro- and a few on mesopleura black. Tomentum at base of costa white.

Abdominal dorsum relatively densely white tomentose, that on posterior quarters of segments two to four being somewhat less dense, that on sides of fifth dark gray to black. Pile relatively sparse and coarse, somewhat more dense on first and sides of other segments. Pile on first three segments mostly yellow to white, palest anteriorly, a few on anterior angles of first, the lateral fringe and two or three rows on posterior margins of second and third, and all of that on fourth and fifth segments black. Pale markings of abdominal venter narrower than those of male; pile wholly black.

Types.— Male *holotype*: Tucson, Pima County, Arizona, April 24, 1954 (F. G. Werner).

Female *allotype*: West of Standfield, Pima County, Arizona, April 11, 1954 (Butler and Werner). *Paratypes*: 1 ♂ 1 ♀ same data as the holotype. The holo- and allotypes are in our collection. The paratypes are in the collection of the University of Arizona.

Specimens of this species will run to *apicula* in Hall's key. However, the males of this species may be separated from those of *apicula* by the lack of the black lateral fringe so typical of the latter, from *sororculus* by the black pile on the margins of the mesonotum, and from both by the black pile of the upper occiput. The black pile on the abdominal dorusm readily distinguishes the females of this

species from all others in this group. In addition, the females have a higher, more vertical front than females of the other species.

Lordotus apicula Coquillett

Coquillett's type, a female from Colorado, is in the U. S. National Museum. Although partially rubbed, sufficient characters remain intact to render identification of comparative material certain. Inasmuch as we have several forms which fit this species in Hall's tables of species, and which fit equally well the decriptive matter so far in print, we deem it advisable to here redescribe both sexes of *L. apicula* Coq. from material in our collection collected in Skull Valley, Tooele County, Utah, the females of which have been compared directly with Coquillett's type and found identical with it in all characters studied.

Male.—Black. Oral margin shining, rest of head faintly gray pollinose; pile of face, lower occiput, a single row along upper orbits and on antennae black, that on upper occiput nearly white, on ocellar tubercle dark gray; tomentum of upper occiput nearly white, of lower occiput black. First antennal segment a little more than three times as long as wide; second segment about as wide as long, same width as first; third segment only slightly longer than first two combined, widest at the basal fourth; pile of first short above and long beneath, of second segment all of about the same length; third segment with a few very short hairs on the inner side. Proboscis about one-half as long as body; palpi about one-fifth as long as proboscis.

Thorax faintly gray pollinose, that on pleura faintly iridescent; pile of mesonotum mostly whitish gray, a few along lateral margins dark gray to coal black, prealar bristles dark gray, postalars nearly white; pile of pleura wholly coal black. Scutellum somewhat more pollinose than rest of thorax, hind margin only slightly less so than disk; pile and marginal bristles nearly white, the latter hardly differentiated from the pile.

Base of wings, costa, subcosta, and bases of marginal and first submarginal cells faintly yellowish, rest of wing clear hyaline; veins yellow basally, brown distally; pile at base of costa black, hair-like tomentum white. Wings not denticulate. Squamae dark gray; pile dark gray to black. Halteres yellow, knobs nearly white; a row of very short black hairs behind, distally.

Legs black, their vestiture wholly black, the tomentum with purplish reflections in some lights

Abdomen subshining blue-black; pile of venter and dense lateral fringe black, of dorsum dense, white, the line of demarcation between black and white abrupt.

Female.—Except for sexual differences much like the male. The broad front pollinose on lower half, shining black above; very sparsely white tomentose Pile of front black on sides, white in middle and on ocellar tubercle. Antennae somewhat shorter, the third segment without hair. Pleura with considerable brown in ground color,

pollen tinged with brownish. Mesonotum very sparsely white tomentose. Thoracic bristles white or nearly so. Vestiture of legs not quite as deeply black as in male. Second to fifth terga with sparse white tomentum basally; a single row on posterior margin of fourth and all of hairs on posterior half of fifth segments black. Pile of abdomen not quite as dense as in male, that of venter and lateral fringe with brownish reflections.

Specimens in our collection are from six to ten millimeters in length. We have collected them from April to July in various localities in Kane, Millard, Sanpete and Tooele Counties in Utah.

In addition to the variation in size there is some variation in the amount of black pile on the dorsum of the female. In some specimens there are only one or two black hairs at the hind angles of the fourth tergum, and the black pile of the posterior half of the fifth is mixed with white.

Lordotus arnaudi, n. sp.

Dark brown; wings hyaline, not denticulate in male; third antennal segment about as long as other two combined. Length 5-7 mm.

Male.—Except oral margin, head lightly yellowish gray pollinose; except for row of dark hairs along orbits, pile of upper occiput nearly white; of rest of head dark chocolate brown to black; tomentum of occiput yellowish brown. First antennal segment about same two and one-half times as long as wide; second segment about same width as first, slightly longer than wide; third segment about as long as first two combined, widest at about the basal third. Proboscis about two-thirds as long as body; palpi about one-fifth as long as proboscis.

Thorax lightly gray to grayish brown pollinose, with indistinct longitudinal striping visible from some angles, on the mesonotum; pile and bristles of mesonotum and scutellum very pale yellowish gray, that of pleura brown.

Wings clear hyaline, the base and costal area yellowish; veins yellowish brown basally, darker apically. Pile and tomentum at base of costa dark brown to black. Squamae pale brown, pile very pale brown. Halteres pale brownish yellow, the knobs nearly white.

Legs dark brown, the tibiae somewhat lighter; vestiture dark brown to black.

Pile of abdominal dorsum dense, very pale brown, darker in the lateral fringe, the individual hairs darker basally, nearly white at tips; a loose patch of pale brownish yellow scales centrally on hind margin of each segment except the first, an occasional hair-like scale on hind margins other than in the middle of segments. Pile of venter black; sparse tomentum appearing to be golden brown. Genitalia brown, pile pale yellowish brown.

Female.—Except for sexual differences, much like the male. Broad front and occiput pale brownish yellow pilose and tomentose. Mesonotum and scutellum with moderately sparse tomentum. Legs

lighter color than in male, tibiae yellowish brown. Abdominal dorsum moderately tomentose; a few black hairs at apex of fifth tergum.

Types.—Male *holotype* and female *allotype*: Gordas Point, Isla Ceralbo, Gulf of California, Mexico, March 20, 1953 (Paul H. Arnaud). *Paratypes*: 1 ♀ same data as types, 1 ♂ Isla Partida, Gulf of California, Mexico, March 23, 1953 (Paul H. Arnaud). The holo- and allotypes are deposited in the California Academy of Science. The paratypes are in our collection.

This species may be separated from *lutescens* by the smaller size, the sparser pile, by the pattern of the tomentum on the abdomen, and by the shape of the third antennal segment of *lutescens* being proportionately much longer. *Arnaudi* may be separated from *apicula* and *sororculus* by the darker pile on the abdominal dorsum, and from *abdominalis* by the paler pile on the upper occiput. In Hall's key the males of this species run to couplet 14, where they agree entirely with neither statement. The females run to couplet 10 where neither statement applies.

The male paratype lacks the tomentum on the abdominal dorsum and the dark pile is somewhat darker than in the type, but it agrees very well otherwise.

It gives us pleasure to name this species after its dicoverer, Mr. Paul H. Arnaud, whose fine specimens of this and other genera have been very helpful to us.

Lordotus divisus Cresson

On May 3, 1959, about two road miles below the summit of Pioneer Pass, in the Mescal Mountains, Pinal County, Arizona, the writers collected seven males and one female of this species, for the first time, to our knowledge, definitely associating the sexes of this fairly widespread but apparently rather rare fly (Hall, op. cit. p. 27). We have before us seven other females from various localities in Arizona and Texas which agree with this specimen. Our material differs somewhat from the two California females described by Hall in that on the abdominal dorusm the black pile does not extend anteriorly beyond the fourth tergum and the pale tomentum does extend posteriorly onto the fourth and fifth. In most of our specimens the black pile is found only on the hind margin of the fourth and over the whole of the fifth. In one specimen there are white hairs mixed with the black on the fifth tergum. The total number of specimens examined is insufficient to indicate whether or not these variations are geographically constant.

Inasmuch as it fails to take into consideration the white pile on the abdominal dorusm of *divisus*, couplet 7 of Hall's key to the females is misleading and will lead to misdentifications. In his key our material runs to *apicula*. When viewed from directly behind, the scutellum in both sexes is pollinose on the disc and shining black on the hind margin, a character by which this species is readily distinguished from its near relatives.

Lordotus junceus Coquillett

Hall reported specimens of this species from as far south as Mexicali, Baja California, Mexico. On March 23, 1953, Paul H. Arnaud collected several specimens of both sexes at Bahia Amortajada, Isla San Jose, Golfo de California, Mexico. This capture extends the known range of the species some six hundred miles southward. Compared directly with Coquillett's type in the U. S. National Museum these specimens appeared to be identical in all characters studied.

Specimens in the Snow Entomological Museum collected at Las Cruces, New Mexico, 1954, by R. H. Beamer, extend the known range of the species for the first time into that state and somewhat more than two hundred and fifty miles further to the east than heretofore reported In the females of this series the tibiae and tarsi are paler and the yellow on the posterior margins of the terga is wider than in California specimens.

Lordotus lutescens, n. sp.

Wings hyaline; pile grayish yellow, venter mostly dark pilose; legs black in both sexes. Length 9-13 mm.

Male.—Black, densely clothed with mostly pale grayish yellow pile. Small frontal triangle, face and occiput gray pollinose. Except for that on occiput, pile of head black. Antennae black; first segment about twice as long as second, third segment a little longer than first two combined, widest at the basal third; pile black, that on first segment short above and long below. Proboscis slender, about half as long as head and body combined; palpi about one-sixth as long as proboscis, their pile black.

Pile of anterior half of thoracic dorsum dense, of posterior half much less so; bristles hardly differentiated, of same color as pile. Pleura subshining dark brown, faintly grayish pollinose; a few dark hairs intermixed with the pale ones before the wing.

Wings hyaline, only base of wing, costa and subcosta yellowish; veins yellow, somewhat darker apically; costa not denticulate, pile at base of costa pale yellow. Halteres grayish yellow, their knobs nearly white.

Individual hairs of dorsum and sides of abdomen darker basally than the rest of the hair, giving from any aspect a shadowy effect to the sides of the part viewed. Pile of extreme lateral margins of terga and of venter blackish brown to black. Pile of genitalia nearly white.

Legs black, the vestiture black, the tomentum with purplish reflections.

Female.—In general appearance much like the male. Pile of face, front, antennae and coxae the same color as that of the thorax and abdominal dorsum. Front densely clothed with pale grayish yellow hair-like tomentum. Thorax faintly marked with longitudinal vittae. Mesonotum and abdominal dorsum with sparse hair-like to-

mentum, that on the abdomen somewhat denser along a median line. Less dark pile in the lateral fringe, and some pale pile intermixed with the dark on the venter.

Types.—Male *holotype* and female *allotype*: Las Cruces, New Mexico, April 25, 1954 (L. D. Beamer). *Paratypes*: 15♂, 6♀ same time and place as types (L. D. Beamer and R. H. Beamer). The holo- and allotypes and part of the paratypes are in the Snow Entomological Museum, University of Kansas. The rest of the paratypes are in our collection and in the collection of the Brigham Young University.

Lordotus perplexus, n. sp.

Black, hyaline wings, those of the male not denticulate; pile of venter dark brown; tomentum present on dorsum of thorax and abdomen of both sexes. Length 5½-9 mm.

Male.—Dark brown, tibiae and basal tarsal segments reddish brown, this color visible under the dense dark tomentum only in certain lights. Lower face shining; upper face, front and occiput gray pollinose. Pile of antennae, face, lower occiput, and row on upper occiput black; rest of pile of upper occiput white or nearly so, that on ocellar tubercle mixed black and pale yellow; tomentum of occiput sparse, white above, somewhat darker beneath. First antennal segment two and one-half times as long as wide; second segment same width as first, about as long as wide; third segment about one and one-third times as long as the other two combined, widest at the basal fourth. Proboscis about as long as head and thorax combined.

Thorax lightly gray pollinose, as viewed from in front indistinctly longitudinally vittate; pile of mesonotum moderately dense on anterior half, very pale yellowish gray, nearly white in some lights, more yellow on posterior half and on scutellum, that of pleura pale yellow to nearly black, mostly chocolate brown; bristles yellow. There is sparse, hair-like nearly white tomentum on mesonotal disk and scutellum.

Wings clear hyaline, not denticulate; veins yellow, darker distally. Tomentum at base of costa brown. Squamae white, the fringe pale yellow; halteres pale yellow, the knobs nearly white.

Abdominal pile dense, nearly white dorsally, shading to brown in the lateral fringe and on the venter, the line of demarcation not distinct. Sparse, nearly white hair-like tomentum on dorsum, concentrated mostly on bases and apices of segments. Very sparse hair-like tomentum of venter brown.

Female.—Much more tomentose and less pilose than the male. Broad front and upper occiput moderately densely tomentose. Third antennal segment more slender, and relatively longer than in the male. Thorax much more tomentose, the pile paler. Abdomen moderately densely tomentose, the tomentum somewhat more dense on the posterior third of the segments.

Types.—Male *holotype* and female *allotype*: Rillito, Pima County Arizona, March 20, 1934 (A. J. Basinger). *Paratypes*: Arizona:

1 ♂ same data as types; 3 ♂ Tucson, IV-18-1955 (G. D. Butler); 1 ♂ 1 ♀ Sabino Canyon, Santa Catalina Mts., IV-6-55 and V-5-55 (G. D. Butler and Floyd Werner); 1 ♀ west of Standfield, IV-13-55 (Butler and Werner). California: 4 ♀ San Diego County (Coquillett).

The holo-and allotypes and part of the paratypes are in our collection. The rest of the paratypes are in collections of the University of Arizona, Brigham Young University, and the U. S. National Museum.

In Hall's key this species will run to *apicula*, which it closely resembles. The females differ from those of *apicula* in the pollinose front, far more abundant and coarser tomentum on front, thoracic dorsum and abdomen, and in the shape of the front. The males of this species differ from those of *apicula* in the presence of the tomentum, sparse though it may be, on the mesonotum and abdominal dorsum. Both sexes differ in being paler in ground color of body and legs, in having paler pile on the pleura and venter and darker on the dorsum, and in the pale pile of the abdominal dorsum blending into the dark pile of the venter in contrast to the abrupt line of demarcation exhibited by *apicula*. Also, the pile of this species is somewhat shorter and coarser and less abundant than that of *apicula*.

Lordotus sororculus sororculus Williston

In a series of specimens of this species taken at Inyokern, Kern County, California, the tibiae very from black to reddish brown, and, contrary to Hall's re-description, the tomentum of the legs is mostly pale. This series was collected a very few miles from the type locality. Specimens compared directly with Williston's type agree in all characters studied. Material collected at Dateland and 10 miles East of Aztec, Navajo County, April 12, 1955 by Drs. Floyd G. Werner and George D. Butler, Jr., extends the known range of this species into east central Arizona. These specimens, five females, average larger than our California material but agree very well otherwise with the paler of the specimens from the latter state.

Lordotus sororculus nigriventris, n. subsp.

Differs from *sororculus* Williston in possessing many more black hairs on pleura, legs and abdominal venter. Length 5-9 mm.

Male.—Black. Head, except shining black oral margin, gray pollinose; pile of face and lower occiput black; of upper occiput mostly snowy white, a row of black hairs along hind orbits which does not reach vertex. Behind this is a row or two of grayish yellow hairs; sparse hair-like tomentum of occiput nearly white. Antennae black, black haired; first segment about two and one-half times as long as wide; second segment about the same width, about as long as wide; third segment about as wide as first two and about one and one-half times as long as both of them taken together, widest at its basal third.

Thorax subshining bluish black, very faintly gray pollinose;

pile of mesonotum grayish white, faintly yellowish at sides; bristles pale yellowish. Pile of pleura black, sparse except for tufts on upper meso- and metapleura; hair-like tomentum nearly white, confined to the patch of dense pile on upper mesopleura.

Wings not denticulate, clear hyaline, only the base of the wing and subcosta pale yellowish; veins yellow basally, becoming brown distally; pile and tomentum of base of costa black and grayish yellow. Halteres yellow, their knobs nearly white.

Legs black, their vestiture black, with purplish reflections in the tomentum in some lights.

Abdomen densely long snowy white pilose, that on sides of first two segments black or dark brown, fading upward and backward to white on the fourth and fifth segments; pile of venter obscured by that of lateral fringe, but evidently black to dark brown on the first three or four segments; a very few white erect hair-like scales on anterior and posterior margins of all terga after the first.

Female.—Much more tomentose and less pilose than the male. Pile of front and upper occiput pale yellow to white, a single row of dark hairs along orbits and transversely just above the antennae; tomentum white or nearly so.

Mesonotum gray pollinose, two indistinct darker longitudinal vittae in the middle and at the sides; tomentum white, moderately dense on anterior end, sparse otherwise; pile white, bristles pale yellow to white. Scutellum gray pollinose, its vestiture very pale yellow to white. Pleura lightly gray pollinose; pile of upper mesopleura mostly pale yellow, rest of pile of pleura dark brown to black.

Pile of abdomen relatively shorter and coarser than in male; snowy white on dorsum and sides, shading to grayish brown to black in lateral fringe; pile of center mostly brown to black.

Types.—Male *holotype* and female *allotype*: Skull Valley, Tooele County, Utah, May 13, 1956 (D. E. Johnson). *Paratypes*: Tooele County: 5♂ 4♀ same locality as types, May 13 to June 2; 5♂ 2♀ Dugway Mountains, May 25, 1958; 1♀ Dugway Valley, April 23, 1956; 1♂ Granite Peak, May 20, 1958; 1♂ Southeast end Cedar Mountains, May 29, 1956; 2♀ Wig Mountain, April 23, 1956. Sanpete County: 1♂ Gunnison, May 31, 1956. All specimens collected by D. E. Johnson. Types and some paratypes are in our collection; part of the paratypes are in the collections of the Brigham Young University and the University of Utah.

This subspecies runs to either *sororculus* or *apicula* in Hall's keys, depending on the individual interpretation of couplet 15 in the key to males and couplet 8 in the key to females. From the nominal subspecies, *nigriventris* is distinguishable by the many more black hairs of pleura, venter and legs. The sharp line of demarcation between the black and white pile in the lateral fringe of *apicula* will serve to separate this species.

gibbus group

In addition to the general characters of the genus, this group is

characterized by the lack of an antennal style and by denticulate costa in the male. Frequently, but not always, the sexes differ in ground color of body and legs and in color of vestiture, the males usually having various shades of pale yellow to grayish white pile, while the females are usually various darker shades of yellow to yellowish gray. In most cases the males have a more or less well defined cross-band of dark pile on one or more of the caudal abdominal segments.

Species and subspecies included in this group are: *albidus* Hall; *arizonensis* Johnson and Johnson, new species; *diversus diplasus* Hall; *diversus diversus* Coquillett; *gibbus gibbus* Loew; *gibbus striatus* Painter; *pulchrissimus luteolus* Hall; *pulchrissimus pulchrissimus* Williston; *zona* Coquilett.

Lordotus albidus Hall

Specimens from Tucson, Arizona show some small variations from California specimens we have examined. The yellow in the wings extends well into the first submarginal, discal and second basal cells. The pile of the venter of the males and of all the body of the females is more yellow than in our California material.

Lordotus arizonensis, n. sp.

Female.—Length 7-12 mm. Head densely gray pollinose; pile and tomentum white, the latter sparse on face and front and moderately dense on hind orbits. Antennae black, first two segments gray pollinose; first segment about four times as long as wide; third segment about three-fourths as long as first two combined, widest at basal third. Pile of first segment moderately short, pale yellow above, long white beneath; of second segment short and white or nearly so. Proboscis about as long as head and thorax exclusive of scutellum; palpi black, about one-fifth as long as proboscis, pile white.

Thorax black, edges of mesonotum and pleura gray pollinose; pile moderately dense, whitish gray on mesonotum and scutellum, white on pleura; bristles white; sparse tomentum hair-like, white.

Wings clear hyaline, a small faint spot of yellow in middle of first basal cell; veins yellow, brownish distally; costal pile black, pile and tomentum at base white. Halteres yellow, knobs paler.

Coxae and femora black, tibiae yellow, tarsi yellow basally to dark brown distally; pile and tomentum of coxae and femora white, a stripe of yellow hairs and scales on anterior side of latter; pile and tomentum of tibiae yellow, bristles black.

Abdomen black; pile moderately long and dense, of first three terga pale whitish gray, the individual hairs somewhat darker basally; pile of fourth and fifth terga black, a few on apex of fourth and many on apex of fifth with apical half or more gray to white. Venter obscured by dense pile which is white on first three segments, black on remaining two. Abdomen almost wholly devoid of tomentum, only an occasional hair-like scale occuring on second and third terga.

Male.—Much like the female. Pile generally more abundant and longer. Third antennal segment somewhat narrower, almost parallel-sided. Costa denticulate. Much of the pile of the fourth and sixth terga gray to white. Abdominal venter almost wholly white pilose.

Types.—Female *holotype*: Sabino Canyon, Santa Catalina Mountains, Pima County, Arizona, October 17, 1954 (G. D. Butler, Jr.). Male *allotype*: Madera Canyon,, Santa Rita Mountains, Arizona, September 23, 1956 (F. G. Werner). *Paratypes*: 2♀ same data as holotype; 1♀ Mescalero, Otero County, New Mexico, October 2. The holo- and allotypes are in our collection, the paratypes are in the collections of the U. S. National Museum and University of Arizona.

Except for the completely hyaline wings this species closely resembles gray specimens of *gibbus*. They also resemble the males of *pulchrissimus* in general appearance, but differ markedly from the females of that or any other of the clear-winged species by reason of the black pile on the fourth and fifth abdominal segments. In Hall's keys the females of this species will run to *albidus*, the males to couplet 11 where neither statement fits exactly.

Lordotus gibbus gibbus Loew
and
Lordotus gibbus striatus Painter

These two subspecies are both found in Utah. On a number of occasions we have collected both on the same day. But so far we have not found them directly associated together. We have found that especially in the western part of Utah *gibbus gibbus* is in the higher elevations, while *gibbus striatus* is to be found on the valley floors. A specific example which may be cited includes specimens collected in the dunes in Skull Valley, Tooele County, at an elevation of about 4600 feet and at Willow Springs, Stansbury Mountains, at an elevation of about 5800 feet. The two localities are five miles apart, with an elevation differential of 1200 feet. On September 14, 1957, *Lordotus g. striatus* was common in the dunes while *g. gibbus* was equally common at the higher elevation. In several other localities we have found the same situation to exist.

Lordotus pulchrissimus pulchrissimus Williston

Hall did not list this subspecies from Arizona. We have examined several specimens of both sexes collected at Tucson by George D. Butler, Jr., J. M. Breazeale, Tom Embleton and G. G. Johnson. They were taken September 29 through November 1.

miscellus group

The species of this group are characterized by a well defined antennal style and by denticulations on the costa of the male. Ground color and color of vestiture is mostly the same in both sexes. The males bear at least some hairlike tomentum on the sides of the

abdomen at the posterior and anterior margins of the terga. In his characterization of the genus *Lordotus* Loew, Hall (Op. cit. p. 4) excludes this group of species from the genus by his first statement, "Antennal style wanting". He did, nevertheless, correctly figure the antennae of both sexes of *L. bucerus Coq.*, plainly depicting a terminal style (Ibid p. 21, figures 12 and 13). He incorrectly figured the antenna of *L. miscellus* Coq., without showing the style which it bears (Ibid p. 20, figure 20). At the present time we do not consider this single morphological deviation of sufficient significance to justify the erection of a new genus to receive the species which possess it.

The species and subspecies included in this group are: *bucerus* Coquillett; *cingulatus* Johnson and Johnson, new species; *cingulatus lineatus* Johnson and Johnson, new subspecies; *cingulatus rufotibialis* Johnson and Johnson, new subspecies; *miscellus melanosus* Johnson and Johnson, new subspecies; *miscellus miscellus* Coquillet.

Lordotus bucerus Coquillett

Hall speculated that this species might range into Nevada and Arizona. We have seen specimens from the following localities in the latter state: 1♂ 1♀ Ehrenberg, April 16, 1939 (F. H. Parker); 1♀ 10 miles east of Aztec, April 12, 1955 (F. G. Werner); 1♂ Yuma, April 13, 1955 (Butler and Tuttle).

Lordotus cingulatus, n. sp.

Black; wings clear hyaline, denticulate in male; abdominal venter with dark hair on at least fourth segment. Length 5-10 mm.

Male.—Head cinerous pollinose, pile and tomentum white. Antennae black, faintly cinerous pollinose; first segment about three times as long as wide; second segment about as wide as long, about one-third as long as first; third segment with distinct style, about one and one-fourth times as long as first two combined, basal half of this segment about one-half wider than distal half. Pile of first two segments short and black above, long and pale yellowish beneath, white at base of first segment. Proboscis nearly half as long as body; palpi about one-sixth the length of proboscis, hairs pale yellow.

Mesonotum very faintly gray pollinose, faint indications of longitudinal stripes visible only in some lights. Pile of anterior half nearly white, of posterior half yellowish; bristles yellow. Pleura lightly cinereous pollinose, white tomentose and pilose.

Wings clear hyaline; costa denticulate, a patch of pale yellowish pile and white tomentum at its base; veins yellow at base, shading into brown distally. Squamae pale yellow, fringe white. Halteres yellow, knobs nearly white.

Legs black, knees yellow, tarsi brown; pile and tomentum white; bristles black.

Abdominal dorsum subshining; pile on sides of first three segments and anterior half of fourth white, shading upward to brownish yellow on the dorsum, that of the posterior half of fourth and

fifth and sixth mostly brown to black, darkest on the dorsum; pile of seventh segment and genitalia white, or nearly so. Tomentum confined to anterior and posterior margins of segments, appearing as prominent cross-bands on the hind margins of second, third and fourth segments. From the lateral aspect, these cross-bands appear to reach from the venter to about four-fifth the distance to the dorsum. Only a few scales appear at the other interstices.

Female.—In general appearance paler than the male; more tomentose. Tomentum of broad front white; pile pale yellow. Short pile on upper sides of first two antennal segments yellow to brown. Anterior half and sides and hind margin of posterior half of mesonotum and of scutellum white tomentose; thoracic bristles pale brownish yellow. the prealars nearly white. Wings not denticulate. Knobs of halteres somewhat darker than in the male. Pile of abdomen mostly white on venter and pale brownish yellow on dorsum, a conspicuous band of mostly black pile around the fourth segment from which the species derives its name. Pile of fifth segment wholly white. Appressed white tomentose cross-bands complete on all abdominal segments; the only trace of a longitudinal stripe is a slight thickening of the tomentum in middle of each band; no scattered tomentum on segments between cross-bands.

Types.—Male *holotype* and female *allotype*: Whitewater, Riverside County, California, October 28, 1934 (A. J. Basinger). *Paratypes*: California: 3♂ 9♀ same data as types; San Bernardino County: 1♂ Quail Spring, October 5, 1934 (A. J. Basinger); 1♀ Victorville. October 26, 1936; 4♂ 3♀ Yucca Valley, October 5, 1934 (A. J. Basinger). Arizona: Mohave County: 7♂ 17 miles north Wolf Hole, September 9. 1958 (D. E. and L. M. Johnson). Pima County: 1♀ Tucson, October 5, 1923; 1♀ Tucson, October 15, 1955 (F. G. Werner).

The holo-and allotypes and part of the paratypes are in the California Academy of Science. The rest of the paratypes are in our collection and those of the University of Arizona and Brigham Young University.

In Hall's key this species runs to *miscellus*. However, the males of this species have black pile on the venter of at least the fourth sternite, which *miscellus* does not have. The prominent black band encircling the fourth abdominal segment of the females of this species will readily separate them from *miscellus* females.

In our opinion. Hall either overlooked or chose to ignore the differences between this species and *miscellus* and lumped the two.

Lordotus cingulatus lineatus, n. subsp.

Differs from *cingulatus* in having darker pile and tomentum in both sexes, and in the females being conspicuously marked with a median longitudinal stripe of dense tomentum extending the entire length of the abdominal dorsum. Length, 6-9 mm.

Male.—Dark brown, only the knees and halteres yellow. Head cinereus pollinose, somewhat darker on the upper occiput; tomentum

faintly tinged with yellow, dense on face and cheeks, and on lower posterior orbits. First antennal segment two and one-half times as long as wide; second segment about as wide as first, only slightly longer than wide; third segment about one and one-fourth times as long as first two combined, slightly wider than first segment, widest at basal third, sides of apical third almost parallel; style cylindrical, hardly as long as wide. Pile of first segment short, dark above, long, pale beneath; pile of second segment mostly short, dark.

Mesonotum faintly pollinose, grayish anteriorly, shading to brown posteriorly and on scutellum; pile yellowish brown, nearly white anteriorly, darker posteriorly and on scutellum; pleura densely gray pollinose; pile and tomentum white below, lightly tinged with brown above.

Wings hyaline, faintly tinged with brown in basal half of marginal and all of first basal cells; veins yellow basally, brown distally; costa denticulate, pile and tomentum at its extreme base pale yellow.

Pile and tomentum of legs nearly white, only slightly tinged with grayish yellow; bristles black.

Abdomen sub-shining; dense cross bands of white tomentum at interstices of segments interrupted in middle of dorsum by about one-third the width of the abdomen; pile of dorsum pale grayish yellow to dark brown or black, that on each segment anterior to the sixth pale anteriorly and laterally, and dark posteriorly, the dark pile on fourth and fifth segments mostly black, entirely encircling the abdomen; except for that of fourth and fifth segments, pile of venter mostly white.

Female.—Much more tomentose than the male; broad front densely pale grayish tomentose; pile of front, vertex, and upper occiput yellowish brown, that of face and lower occiput white. Moderately dense tomentum of mesonotum and scutellum very pale yellowish gray; pile pale to dark brown. Wings not denticulate. Dense tomentose cross-bands at abdominal interstices not interrupted across dorsum, faintly tinged with brown; a median longitudinal stripe of dense tomentum runs entire length of abdominal dorsum; band of dark pile encircling abdomen confined to the fourth segment.

Types.—Male *holotype* and female *allotype*: 10 miles east San Quentin, Baja California, Mexico, September 10, 1955 (Paul H. Arnaud, Jr.). Paratypes: 3♀ same data. All specimens are in our collection.

The vestiture of this subspecies is much darker generally and the scales which make up the cross-bands on the abdominal interstices are larger individually and far more numerous and more extensive in this subspecies than in the other two. The median longitudinal tomentose stripe on the abdominal dorsum of the females of this form is a very conspicuous feature.

Lordotus cingulatus rufotibialis, n. subsp.

Differs from *cingulatus* in that in the females the tibiae and

basal tarsal joints are yellowish red, and the band of black pile on the fourth abdominal segment is interrupted, there being few or no black hairs on the venter of this segment.

The males are indistinguishable from those of *cingulatus* and are identifiable only by association with the females.

Types.—Female *holotype* and male *allotype*: Phoenix, Pima County, Arizona, September 9, 1940 (F. H. Parker). *Paratypes*: 1♂ 1♀ same data as types; 2♂ 1♀ San Carlos Res., Ash Creek Fl., Arizona (N. J. Nerney).

The holo- and allotypes and part of the paratypes are in our collection. The rest of the paratypes are in the collection of the University of Arizona.

Lordotus miscellus Coquillett

The type series of this species is in good condition in the U.S. National Museum. Since none has previously been published we deem it advisable to designate a lectotype from this series. The specimen selected is a male, bearing the data labels "Cal. Coquillett Collector, U.S.N.M. Acc. 10336, type specimen. Cotype No. 988 U.S.N.M., *Lordotus miscellus* Coquillett Type." The last label is in Coquillett's neat hand. Dr. Willis W. Wirth assures us that he has appropriately labeled the specimen.

Inasmuch as the type locality is broadly listed as "Cal." and inasmuch as we have material in good condition in our collection which, upon direct comparison with it, appears to be identical with the lectotype in all characters studied, we herewith limit the type locality to Walker's Pass, Kern County, California. In September, 1945, this species was represented by countless individuals on the sandy ground among the Joshua trees in the canyon on the Great Basin or desert side of the Pass.

Being based, we believe, on a mixed collection containing specimens of both *miscellus* and *cingulatus*, Hall's redescription of this species is not quite accurate. Except that he does not mention the style on the third antennal segment, Painter[5] gives an adequate description of the species, drawn at least in part from the type series. In Hall's discussion there is an obvious lapsus in that he states on page 15 that "the male of *miscellus* does not have the costa denticulate."

Lordotus miscellus melanosus, n. subsp.

Differs from *miscellus* Coquillett in having much darker pile on the abdominal dorsum in both sexes and in the tomentum on the hind margins of the tergites being much less extensive in the males. Length 3½-9 mm.

Male.—Black. Head cinereous pollinose, faintly yellowish on upper occiput. Tomentum of head white; pile white, faintly yellowish on occiput and ocellar tubercle. Antennae black, faintly cinereous

5. Painter, Reginald H. Notes on Type Specimens and Descriptions of New North American Bombyliidae. Trans. Kansas Acad. of Sci. Vol. 42, 1939, pp. 267-301, 2 plates.

pollinose; first segment three times as long as wide; second segment about as long as broad, about as wide as first; third segment with distinct style, almost parallel-sided, about one and one-third times as long as first two combined. Pile short and black above, long pale yellow to brown beneath, two or three nearly black hairs near apex of first segment. Proboscis black, about two-fifths as long as body and head; palpi about one-fifth as long as proboscis, pile white.

Mesonotum pale brownish pollinose, marked with three paler longitudinal stripes. Pleura densely cinereous pollinose. Pile of mesonotum mostly pale brownish yellow, nearly black just before the scutellum; tomentum nearly white, very sparse. Prealar bristles pale brown, postalars black. Pile and tomentum of pleura faintly yellow above to white below. Scutellum faintly brown pollinose, its pile nearly black, paler at sides.

Wings clear hyaline; veins yellowish basally, dark brown distally; costa denticulate, nearly white pile and tomentum at its base. Squamae nearly white, long white pilose. Halteres yellow, knobs nearly white.

Legs black, knees yellowish; pile and tomentum nearly white; the spines on the fore and middle tibiae black, the large ones on the outside of hind tibiae black, smaller ones on inside brownish yellow.

Abdomen very faintly brownish pollinose, paler on sides and venter; pile mostly white, a broad longitudinal band along dorsum of second to fifth segments inclusive, this band broken on fore half of each segment by pale hairs. The dark hairs of this band are very dark brown to black in middle, somewhat paler at sides. Bands of appressed white tomentum at segmental interstices extend across venter and approximately half way up the sides, this tomentum being present on both anterior and posterior margins of each segment, that on the anterior margins lying closely appressed and parallel to the margin, that on the posterior margins not quite so closely appressed and more or less opposing the margin of the segment, that on one segment somewhat overlying that on the segment behind, giving the effect of a single conspicuous band at each interstice that is smooth on the leading edge and ragged behind.

Female.—Except for sexual differences, much like the male. Somewhat paler in general appearance. Antennae somewhat less parallel-sided than in male, broadest at the middle, tapering distally. Pile of broad front pale yellow, tomentum white, scattered. Mesonotum much more tomentose, especially on fore part. Prealar bristles white, postalar and scutellar bristles pale brown. Scutellum sparsely white tomentose. Cross-bands of white appressed tomentum of abdomen uninterrupted across dorsum, an indistinct central longitudinal stripe of white tomentum runs length of abdomen; a very few other white scales scattered about on abdominal dorsum.

Types.—Male *holotype* and female *allotype*: Little Granite Mountain, Tooele County, Utah, September 14, 1957 (D. E. Johnson). *Paratypes*: Utah: Millard County: 1 ♂ 2 ♀ Antelope Springs, VIII-10-1943; 1 ♂ Delta, VIII-5-1943; 3 ♀ Lynndyl, IX-13-1953;

22♂♀ Topaz (15 mi. Northwest of Delta), VIII-25-1943. Tooele County: 47♂♀ same locality as types, IX-12-14-1955, IX-7-77-1956, IX-12-14-1957; 10♂♀ Dugway Valley, VIII-20-1955. IX-12-1955; 1♂ Indian Springs, IX-6-1956; 2♀ Wildcat Mountain, IX-17-19-1956. Juab County: 11♂♀ Eureka, IX-3-1953. Nevada: Esmeralda County: 1♂ Montgomery Pass, VIII-23-1945. All specimens collected by D. E. Johnson, and are retained in our collection, except part of the paratypes which are in the Brigham Young University and University of Utah.

In addition to the great variation in size, there is some variation in the color of the dark pile of the abdominal dorsum. The smaller specimens tend to have somewhat paler pile and somewhat fewer scales on the abdomen and fewer denticuli on the wings of the males than do the larger specimens. There is a little variation in the relative lengths of the antennal segments.

In the males of *melanosus* the bands of tomentum on the hind margins of the tergites, from the lateral aspect, reach hardly more than half the distance from the venter to the dorsum, and from the dorsal aspect are hardly visible, while in *miscellus* they appear, from the lateral aspect, to reach quite or nearly to the dorsum, and from the dorsal aspect they appear to almost join across the dorsum. In *melanosus* the dark hairs of the abdominal dorsum are dark brown to black, while in *miscellus* they are mostly reddish brown. In *miscellus* the pale hairs of the abdomen are yellowish except on the extreme venter; in *melanosus* most of this pile, except in the dark dorsal band, is white.

As we found *miscellus* very common on the sandy ground among the Joshua trees of Walker's Pass on the western edge of the Great Basin, so have we found *melanosus* very common on the sandy ground among the junipers of the lower hills and among the sand dunes in the valleys of the eastern part of the Great Basin. The type locality of this species is the lower western slope of Little Granite Mountain, a low desert hill on the eastern edge of Dugway Valley, Tooele County, Utah. A scattered stand of Utah junipers occupies the stabilized dunes of the old shoreline of one of the lower levels of Pleistocene Lake Bonneville. *Eriogonum dubium* Stark and various species of *Chrysothamnus* make up the major part of the shrubs present. At the height of its season *melanosus* is to be found here in countless numbers. Associated with it in more moderate numbers are *Lordotus pulchrissimus pulchrissimus* Williston and *L. gibbus striatus* Painter, as well as a number of species of beeflies of other genera.

CARL LINNAEUS' CONTRIBUTIONS AND COLLECTIONS

By Vasco M. Tanner[1]

Carl Linnaeus' Early Life and Schooling

Carl Linnaeus, the eldest of Nils Ingemarsson's large family, was born on the 23rd of May, 1707. Destined to become a revered contributor to the field of taxonomy, Linnaeus' early years were frought with poverty and indecision as to his goal in life. His father, a vicar at Rashult, devoted much of his time to caring for a garden of trees, shrubs, and flowers. The family name, not having been chosen was changed to Linnaeus, out of regard for a large linden-tree which was growing near the home. Carl early displayed an aptitude for the study and care of plants. He shyed away from the high calling of the priesthood which his father intended for him. At school he succeeded in the physical and biological sciences. When twenty years of age, he became an under-graduate in the University of Lund where for one year he began the study of medicine. The next year, 1728, he transferred to the University of Upsala where he could get better training in medicine. Linnaeus, because of the lack of funds, was handicapped in his early studies but due to his manifest native ability and achievement in the Natural Science he was soon rewarded by grants and financial aid.

In 1732, Linnaeus was chosen by the Academy of Upsala to make journeys of exploration in Lapland. He spent five months traveling more than 4000 miles collecting and recording observations on the plants, animals, and customs of the Laplanders. Upon his return to Upsala he began to give lectures on Botany and Natural Science, but was soon prevented from continuing them because of a lack of a degree.

While exploring in Lapland, Linnaeus made the acquaintance of his future wife, daughter of a wealthy physician of Falun. When he asked for her hand in marriage her father consented only on the condition that he would obtain a medical degree and establish himself in the practice of medicine. In order to prepare himself to earn a living he, therefore, decided to finish his medical studies at the University of Harderwyck in Holland. He had practically met the requirements for the medical degree by his previous studies at Upsala.

Linnaeus Spends Three Years in Holland and England

With some financial help from his fiance he entered the University at Harderwyck from which institution he was granted the degree in June, 1735. He did not return to Upsala, but applied himself to the completion and publishing at Leyden of the first edition of the *Systema Naturae* which made of him a famous botanist. His

1. Contribution No. 167 from Department of Zoology and Entomology, Brigham Young University

This portrait of Carl Linnaeus was painted by Martinus Hoffman in 1737 during Linnaeus' stay at De Hartekamp. Linnaeus is shown in his Lapland costume. On his belt is a knife, runic calendar, a tobacco pouch and a pair of gloves. In his left hand he holds a fortune-teller's case. The original portrait is in the National Museum for History of Science at Leyden.

finances now almost exhausted, upon the recommendation of the foremost physician in Europe, Hermann Boerhaave, head professor of Medicine at Leyden University; he became physician in ordinary of the Amsterdam burgomaster Clifford at the Country-seat "De Hartekamp," now the "Linnaeushof."

For a few days in May, 1957, the writer had the opportunity of visiting Linnaeushof. In the middle ages this countryside was treeless and sparsely populated. By the middle of the 17th Century the mercantile population of Holland was establishing country summer residences in this dune area. The lands were planted with oaks, beeches, and firs, etc. in order to bind the drifting sands. Many of these trees still grace the landscape around Linnaeushof. Some of the estates were planted with exotic plants and extensive formal gardens. With the coming of the Amsterdam and Leyden Canals, about 1650, many of the smaller country holdings were consolidated into large estates. One of these was "De Hartekamp."

When Linnaeus took up his abode in the autumn of 1735, as the physician of the wealthy banker, Mr. Clifford, he was overwhelmed by the beauty and richness of the flora and fauna of this homestead. One of the important books which he wrote while at "De Hartekamp," now a book-lover's delight, was "Hortus Cliffortianus." To quote Linnaeus in his preface to this unique book he describes his stay as "the happiest time of my life." He also writes, "My eyes were at once delighted by so many masterpieces of nature supported by art, avenues, flowerbeds, statues, ornamental waters and hills and mazes so ingeniously made. I was fascinated by your menageries full of tigers, monkeys, wild dogs, Indian deer and goats, South-American and African swine. Their cries mixed with those of flocks of birds, such as American Falcons, various kinds of parrots, pheasants, peacocks, guinea-fowls, American black game, Indian fowls, swans, different kinds of geese and ducks, gulls and other kinds of web-footed birds, snipe, American crossbills, different species of sparrows, turtles and other pigeons, as well as many other species of birds whose cries the garden echoed with.

Linnaeus continues: "On entering the hothouses I was amazed at the abundance of plants, as a Northerner I could not but feel bewitched, not knowing in what foreign part of the world I had landed. In the first hothouse masses of flowers originating from southern Europe were grown, plants from Spain, southern France, Italy, Sicily and the Greek Isles. In the second treasures from Asia were found, such as ginger plants, poincains, magistans, coco-and other palms, as well as other species; in the third I saw Africa's plants peculiarly shaped or rather misshaped, such as the numerous forms of aloes and mesembryanthemums, carrionflowers, euphorbias, crassula-and protea-species, etc. In the fourth and last hothouse the charming inhabitants of America and of the rest of the New World were grown, such as big groups of cactus species, orchids, passion-flowers, yam, magnolias, tulip-trees, calabash-trees, arrow-root, cassias, acacias, tamarind-trees, pepper-trees, species of pine-

apple, manicinilla and numerous other plants which surrounded bananas, the most stately plants in the world, exquisitely beautiful hernandios, silvery glossy protea species and most valuable camphor-trees. When after admiring all this, I entered the truly royal house and the extremely instructive museum, whose collections no less added to the proprietor's fame, I stood entirely fascinated, because I never saw the like of it before. My fervent wish was to lend a hand to the care of all this."

It was in such a naturalist's paradise as this that Linnaeus found himself. Here his grandiose plans come to maturity, and as a result of his new situation and studies he wrote some of his botanical books which laid a basis for present day botany. During the next two years he produced a series of works, most of which were new contributions in the field of Natural Science, such as the *Bibliotheca Botanica*, *Fundamenta Botanica*, *Flora Lapponica*, *Genera Plantarum*, and *Critica Botanica*. Linnaeus was busy during the three years he was away from Sweden. In 1736 he spent three months in England; the cost being borne by Clifford. While at "De Hartekamp" 'his health was broken due to long hours spent writing his books. For a year before returning to the University of Upsala in July 1738, he studied at Leyden and visited the great naturalists in Paris.

The leaders in the Haarlem area of Holland in April, 1956, feeling a responsibility towards the past and the future, set aside a portion of the "De Hartekamp" as a botanical garden to be known as "Linnaeushof." The following is a quotation from a speech by the Right Honourable Dr. M. J. Prinsen, Governor of the Province of North Holland at the inauguration of the "Linnaeushof."

"The informant of the Swedish Embassy conveyed to me the kind request to open to the public this garden sacred to the memory of Linnaeus.

"In 1735, he came to our country, and through the great Boerhaave he was placed in entire charge of the botanical garden "De Hartekamp," the country-seat of the Amsterdam burgomaster Clifford. The part which now is the Linnaeushof, was the so-called "Overplaats" of the Hartekamp. Linnaeus had attracted general notice by a booklet of 14 pages only, the *Systema Naturae*, which he had written at Leyden, and which leapt into fame. In this booklet he upheld a novel division of the realms of nature, viz. the vegetable kingdom, the animal kingdom and the mineral kingdom. At the Hartekamp Linnaeus spent happy years, and thanks to his endeavours and work the "Hortus Cliffortianus" was called "Europe's most beautiful garden" in those days already.

"I wish to put forward these few facts in this connection in order to bring home to you that you find yourselves on historic soil, and that you and I are under great obligations to the past. Next to this debt of gratitude there is our responsibility towards the present. For unfortunately the Linnaeushof is one of the few survivals of the ancient hilly woodland between the bulb-district and the more and more increasing population of Haarlem and Heemstede. The

preservation of rural scenery in this country on the estates at the foot of the dunes, and which are on the provisional list of nature reserves, is a matter of national interest."

A year after Linnaeus returned to Sweden he married his faithful fiance, but did not establish a medical practice, since he was appointed to a professorship of physics and anatomy at the University of Upsala. In 1742, he was given the chair of botany which position he held until his death in 1778. He was succeeded by his only son who died in 1783. At the death of his son, his mother and sole executrix offered the whole of the Linnean collections and books for sale.

Linnaeus' Collection and Library Purchased by James Edward Smith of London, England Founding of the Linnean Society of London

Since so few of the local biologists are aware of the present location of Linnaeus' collections and library, I feel that it is an opportune time to make the following brief report to the membership of the Utah Academy.

The following excerpts are from a four-page pamphlet, published by the Linnean Society, entitled: "The Linnean Society of London: Its Origin, History and Objects." October, 1948.

"The circumstances that led to the founding of the Linnean Society of London ten years after the death of the great Swedish naturalist Carl Linnaeus (1707-1778), from whom it takes its name, were closely connected with the purchase of the Linnean Collections by an Englishman. On the death of the younger Linnaeus in 1783, his mother and sole executrix offered the whole of the Linnean Collections to Sir Joseph Banks, and on the morning when this offer was received, James Edward Smith (1759-1828) a young Norwich medical student then settled in London was breakfasting with Banks, who told him that he intended to decline the offer, and strongly urged him to become the purchaser. Smith wrote to Upsala the same day, and the purchase money, one thousand guineas, was advanced by Smith's father; the collections and books arrived in London in 1784.

"The chief collections now possessed by the Society are those of Linnaeus, the younger Linnaeus, and Sir James Edward Smith; also a British Herbarium founded upon the collections of N. J. Winch, W. Withering, and others.

"The Library of the Society has grown rapidly during its existence, and now contains about 70,000 volumes in addition to the books which belonged to Linnaeus, many of which are enriched by his notes; the Society also posses many manuscripts of value, and a fine series of portraits. The number of Fellows exceeds 700, with 50 Foreign Members and 25 Associates honoris causa, as well as 20 ordinary Associates."

Collections of Plants and Animals from America Studied by Linnaeus

Some of the specimens of this valuable collection come from North America. The first English scientist in America was Thomas Harriott, age 25, who came to the Carolinas with Raleigh (1585). He was one of the foremost scholars of his time, having been schooled at Oxford his birthplace, 1560. He made a collection of mammals, birds, fishes and plants. Harriott had a companion, John With (White),[2] who made 112 drawings in water color of the plants and animals studied by him. These drawings are now in the British Museum. When Harriott returned to England he prepared a book *Brief and True Report of the New Found Land of Virginia* which was published at Frankfort-on-the-Main in 1590. In his book Harriott refers to some of the fishes of Carolina; lists the names of 28 species of mammals and 86 species of birds, 25 of which were illustrated by With. The Natural Science of North America thus begins with Thomas Harriott.

Harriott's specimens and report created in the European University circles a keen interest in the flora and fauna of the new found country. In fact, all Europe was anxious to hear the wonders of America and to see the interesting animals and plants which explorers might be able to bring back to the centers of learning. Most, if not all, of these specimens were sought after by princes or wealthy land-holders, the like of Mr. Clifford. Peter Artedi a countryman and classmate of Linnaeus' applied himself to Zoology, chiefly ichthyology. In 1734, he went to London where he continued his studies in Zoology. A year later, 1735, he came to Amsterdam where he was employed to study a larger collection of fishes belonging to a wealthy apothecary. During these years he prepared a work on fishes which was later published by Linnaeus, since Artedi was drowned in the autumn of 1735. Throughout Artedi's treatiese are many references to fishes from America. He saw and studied these fishes in collections at Amsterdam, the Hans Sloane collection in London, and in Chelsea and at Stratford in England. Many of the collections made in America prior to and during the lifetime of Linnaeus fell into his hands and many of the species were described and incorporated into the editions of his *Systema Naturae*.

Captain John Smith who re-established the English in the New World at Jamestown in 1606, had a report on the life of Virginia printed in 1612 and his General History in 1624. In these, birds, mammals and fishes are listed, thus supplementing the reports of Harriott.

In the Plymouth colony such men as Thomas Morton, Thomas Glover, William Wood, and John Josselyn contributed to the knowledge of the natural history of the New England states between 1634 and 1700. Some of these men were correspondents of the Royal Society of London. Charles I and Charles II of England were inter-

2. Rowse, A. L. "The Elizabethans and America Part II. Of Raleigh and The First Plantation." American Heritage, Vol. X, No. 4, pp. 5-19, 1959.

ested in the fauna and flora of the New World, and Charles I sent John Tradescant, the younger, to collect plants and animals.

Other notables of the seventeenth century and early eighteenth century were John Banister (1668-1700); John Clayton (1685-1773); John Mitchell (1680-1772); William Byrd (1674-1744); Dr. Alexander Garden (1728-1791) and Cadwallander Colden (1688-1776). These collectors and observers, along with John Bartram, sent large collections of animals and plants to England. Peter Collinson and John Ellis, London merchants who never were in America, assisted the above-mentioned men to get their collections to England and into the hands of responsible workers.

John Banister, a clergyman and also a student of John Ray, became a careful collector and student in Virginia. He sent a paper to the Royal Society in 1693 with drawings of the land snails and mussels of his area. He also collected insects and sent his observations on fifty-two species to England. This report was published by the Royal Society in 1701. Banister was a botanist of note. His "Catalogus Plantarum in Virginia observatarum" was printed in 1686 and Goode[3] records this as the first taxonomic paper upon natural history which emanated from America.

John Clayton, Attorney-General of Virginia who spent fifty-one years in this country, made a wide collection of plants. He corresponded with Linnaeus and Collinson. His "Flora Virginica" through the assistance of Gronovius and Linnaeus began to be published in 1739 and extended to 1762 before being finished. The large collection of plants as well as manuscripts made by Clayton were destroyed by fire. This was probably the most important botanical work in America prior to Gray and Torrey. According to Goode, Linnaeus is said to have called Clayton the "Greatest natural botanist in the world." and George III honored him in 1765 with the title of "Botanist to His Majesty for the Floridas," and bestowed upon him a pension of fifty pounds a year.

Dr. John Mitchell published a paper entitled the *Elements of Botany and Zoology*. This was in 1738, contemporary with Linnaeus' first edition of his *Systema Naturae*. Mitchell was a fellow of the Royal Society and corresponded with Linnaeus.

Dr. Garden was a botanist, but did his best work in fishes and reptiles. He sent large collections of fishes to Linnaeus. So well preserved were these fishes that when Dr. Goode examined them in 1883, he found them in excellent condition in the Linnaeus' collection in London.

Garden, Colden, Bartram, Mitchell, Clayton, and Ellis, as well as Linnaeus' own students Kalm, Alstroem, and Kuhn, were active in supplying Linnaeus with plant and animal specimens. Great progress was made in bringing to light the fauna and flora of the new, as well as the old world. For example, John Ray in 1690 made an estimate of the number of plants and animals known at that time.

3. Goode, G. Brown, 1886. "The Beginnings of Natural History in America." Proc. Biol. Soc. Washington, Vol. 3, pp. 35-105.

The mammals and serpents were placed at 150 and the birds at near 500. Linnaeus in his twelfth edition described 210 mammals, 124 reptiles and 790 species of birds. Note that 78 mammals, or one-third of Linnaeus' list were American; 88, or two-thirds of the reptiles were from America. and one-third of the birds were American.

It is also of interest to point out that forty-five species of birds known to occur in Utah were named by Linnaeus. Many other species of the Utah fauna were also named by Linnaeus, in spite of the fact that he never traveled outside of Europe and England.

It was my good fortune to spend some time in June, 1957, in the collections and library of the Linnean Society of London now located in the Burlington House. Piccadilly. London, WI. I examined the original journal kept by Linnaeus while on his Lapland expedition. His notes in his hand writing are interspersed with drawings illustrating the plants. animals and Laplander's handy work. I saw the insect collection and was permitted to study some of the specimens with a wide-field microscope.

Linnaeus after 200 Years, 1758-1958; Darwin after 100 Years, 1859-1959

Linnaeus had great ability and a yen to categorize the animate world. True, he used the findings of his predecessors and contemporaries in making his generalizations and establishing his nomenclatorial systems. He did, however, for the first time divide the animal kingdom into classes, which he characterized. introduced orders for the first time into the system of Zoology, besides definitely establishing genera and species which had been vaguely distinguished before. He succeeded in placing every known plant and animal, of his time, into the categories of his system. In doing this he established his binominal system, that of giving each plant and animal species a generic and species name of two words. Linnaeus must also be given the credit for the development of a method of formal description of organisms which is essentially similar to that still in use today.

By the way of review it may be well to point out that during a period of 40 years while Linnaeus was bringing about these reforms, he was building for himself a rating as the outstanding naturalist of the 18th Century. His epoch-making contribution, the *Systema Naturae*, small though it was in the beginning, 1735. grew into a mighty tome by 1766. It is quite impossible to measure its impact upon the development of Natural History in America as well as in the world.

Last year, 1958. we honored Linnaeus for his *Systema Naturae* and other contributions of 200 years ago. This year. 1959, we pause to do honor to Charles Darwin for his "Origin of Species" of 100 years ago. These two great men, however, did not agree as to the origin of species. Linnaeus believed in the fixity of species as opposed to Darwin's belief in changes and evolution by natural selection. The publication of Darwin's "Origin of Species by Means of Natural Selection," has had much to do with the making of contrasts between

the beliefs and practices of naturalists before its appearance and those of their present successors. The coming forth of this book has resulted in a tremendous stimulation of biological thought and work. It has had a great effect upon the Linnean taxonomy, through the introduction of a belief of species continuity and phylogeny. Naturalists for the past century have been led to develop the basic fields of physiology, comparative morphology, embryology, genetics, and ecology and to turn the spotlight of their findings upon the systematics and phylogeny of the almost unbelievably great number of described species.

To both of these great naturalists who helped to bring order and a natural understanding of a world of more than one and one-half million plant and animal species, we owe a great debt of gratitude. Biologists of today follow and use their findings in the building of their biological philosophy.

BACKGROUND RADIATION AND ENDEMIC FAUNAL RANGE IN THE SAN LUIS VALLEY OF SOUTHERN COLORADO

Joseph C. Daniel Jr.[1] and R. Leonard Blain

Mutations, one of the main tools of speciation, can be produced by radiations and are produced proportional to the dosage of radiation. Theoretically then, if adequate isolating mechanisms and selective environmental pressures exist, areas of higher background radiations (i.e. soil and cosmic) should exhibit more speciation than areas of lower radiation. It was decided to test this hypothesis in a locality where these conditions seem to exist.

The San Luis Valley of Southern Colorado (Fig. 1) has variable soil radioactivity and is unique in the variety of its isolating mechanisms. Along with the physical limits imposed by the surrounding mountain ranges, it has a cold, dry climate, a very alkaline soil, and sparse vegetation. (See Ramaley, 1929)

Seven terrestrial animals are known either to be endemic to the San Luis Valley or to have ranges that barely exceed the valley boundaries. Of these, three are insects and four are rodents, groups that generally submit readily to speciation. The ranges of these organisms are not known precisely and were calculated by extending the areas around and between points of observation or collection. The ranges listed below and shown on Figures 2 and 3 are, at best, approximations.

Cicindela theatina Rotger (Sand Dunes tiger beetle): At edge of Great Sand Dunes in sands with scanty vegetation. (Rotger, 1944)

Serica bruneri Dawson (Scarabaeid beetle): In sandy areas around Blanca, Colorado. (Personal communication from Rev. Bernard Rotger)

Pseudohazis hera mangifica Rotger (Small moth): In sage brush belt of Costilla County, probably extending south to Taos, New Mexico. (McDunnough, 1948)

Eutamias minimus caryi Merriam (Cary chipmunk): Eastern part of Costilla and Saguache Counties. (Merriam, 1908; Warren; 1910)

Reithrodontomys montanus (Baird) (Mountain harvest mouse): North-eastern part of the valley. (Baird, 1855; Warren, 1910)

Perodipus montanus (Baird) San Luis kangaroo rat): Sandy areas along eastern side and possibly over whole valley. (Baird, 1855; Warren, 1910)

Thomomys taloides agrestis Merriam (San Luis pocket gopher): Northeastern part of valley. (Merriam, 1908; Warren, 1910)

In addition to these there are three fish; namely *Gila nigrescens* (Girard), *Plantosteus plebeius* (Baird & Girard) and *Tinca tinca* L. (introduced from Europe in 1894). All three are found in the northern Rio Grande drainage, much of which lies in the valley. Since they live in water, fish do not lend themselves to this particular study. The eight-eyed leech, *Theromyzon sp.* has also been described from this area. It was found by Wheeler's expedition in 1874, but the type, and only, specimen is lost.

To measure the soil radioactivity, a grid-section map of the San Luis Valley was prepared. Boundaries were set at 8000 to 8500 feet levels, as determined by the surrounding mountains (boundaries and map outlines from Lantis, 1950). Transect studies depending on available roads were made at six to eight mile intervals. Over a

1. Adams State College, Alamosa, Colorado.

Fig. 1. Location map of the San Luis Valley in Southern Colorado

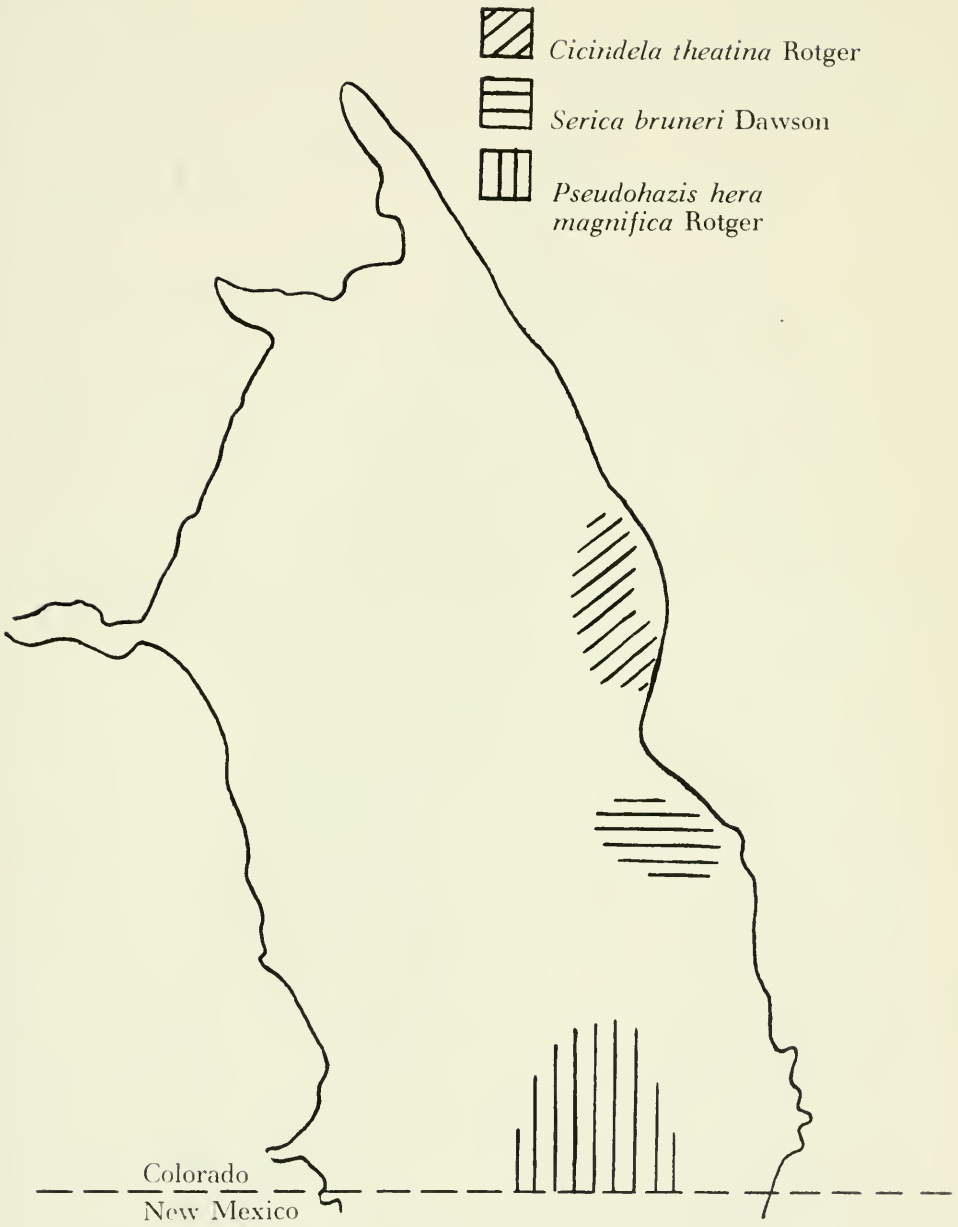

Fig. 2 Approximate ranges of the endemic insects of the San Luis Valley.

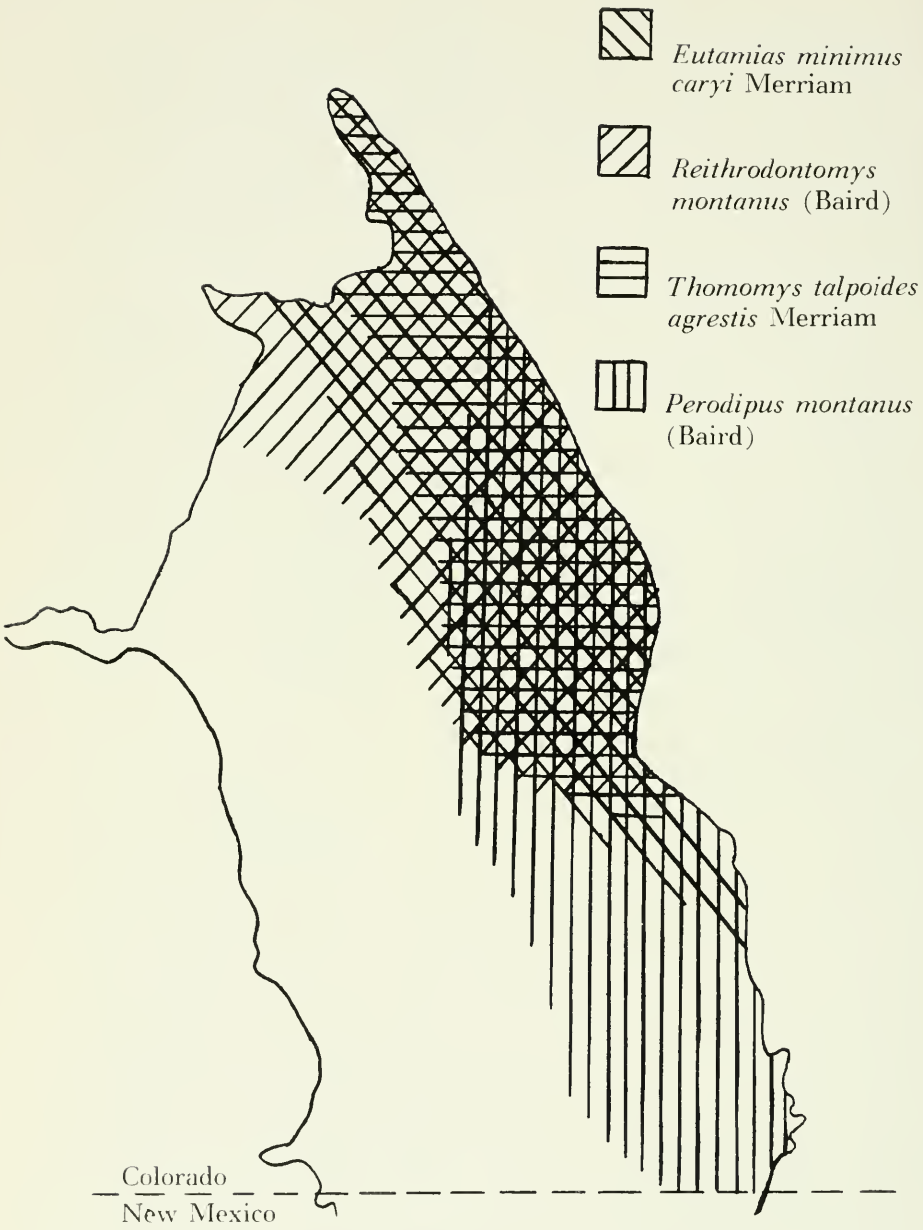

Fig. 3. Approximate ranges of the endemic rodents of the San Luis Valley

Fig 4. Soil radioactivity of the San Luis Valley

four week period in November and December of 1958, background radiation (mostly Gamma) was measured at each transection corner by the use of a "Precision" field scintillator. The results are plotted on the map (Fig. 4) so that the density of the stippling is proportional to the radiation.

The soil radioactivity varied from .011 milliroentgens per hour (mr./hr.) up to .046 mr./hr. One small strip along the southwestern base of Mount Blanca had a maximum reading of .026 mr./hr. and another very high radiation area at the base of the San Juan Mountains in the Cat Creek drainage had a maximum reading of .046 mr./hr. This high intensity fades out gradually both to the north and south. The lowest radiation areas exist in the north and southeastern portions of the valley. Both areas provide about .014 mr./hr. Generally the highest soil radioactivity exists along the western boundary of the valley.

It appears obvious, from reference to the maps in figures 2, 3, and 4, that no correlation exists here between high background radiation and endemic faunal ranges. If anything, almost the opposite relationship seems to exist. The areas in which these endemic forms live are typically characterized by sand, scanty vegetation and some sage brush, and probably as such, furnish the significant isolation and environmental pressures. The background radiation pattern may have had some influence on speciation if we could assume that it was different at the time the species arose or if the species range had changed since. We have no evidence to support either of these hypotheses. It may be noted that in their ranges most of these endemic animals aren't in the high radiation areas. This may be coincidental or may be evidence of some other relationship that could be uncovered by further study.

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DESCRIPTIONS, SYNONYMY, AND CHECK-LIST OF AMERICAN HYDROMETRIDAE

(Hemiptera: Heteroptera).

Carl J. Drake[1] and David R. Lauck[2]

The present paper describes four new species of Neotropical Hydrometridae, and attempts to straighten out the synonymy and confusion in the literature relative to the identification of *Hydrometa caraiba* Guérin-Méneville of Cuba, *H. agenor* Kirkaldy of Ecuador, and *H. championiana* Torre-Bueno of Panama. It also enumerates the species known to inhabit the Western Hemisphere, including their synonymy and distribution. The Mexican and Central American species were collected by the junior author and Wilson Wheatcroft of Bethesda, Md. The types of the new species are in the Drake Collection (USNM).

Hyrometra intonsa Drake & Hottes

Figs. 1, 2, & 13

Hydrometra intonsa Drake & Hottes, 1952, Kansas Ent. Soc., Vol. 25, p. 106

Brachypterous female.—Slightly more robust than male, the color, markings, pronotal, propleural, and acetabular pits practically the same in both sexes. Antennal measurements: I, 0.57 mm.; II, 0.87 mm.; III, 2.50 mm.; IV, 0.76 mm. Wing-pads grayish brown with veins fuscous-brown, reaching a little beyond metanotum. Exterior edge of the apical third and all of seventh connexival segments furnished with moderately long, brownish fuscous, erect hairs (fig. 1). Length 10 mm.

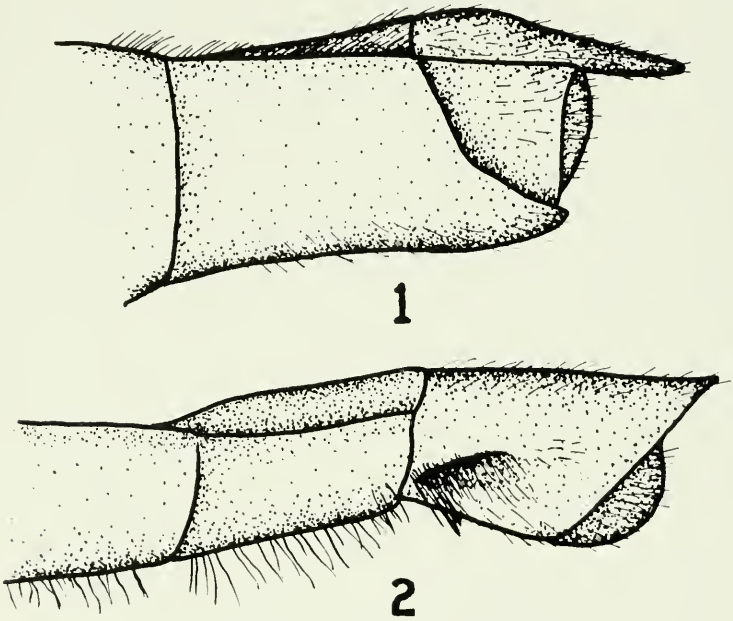
Allotype (female) and two other females, Costa Rica (San Jose), 16. v. 1957. One apterous male was also taken with the allotype. The male (fig. 2) differs slightly from the holotype (brachypterous male, Cuidad Victoria, Mexico) in having the second antennal segment slightly longer (36:31) and the tuft of long hairs on each side (near the hind margin) of the seventh tergite mission. These differences seem to be varietal rather than specific.

1. Smithsonian Institution, Washington, D. C.
2. University of Illinois, Urbana, Illonis. Completed while holding a National Science Foundation fellowship.

Hydrometra ciliosa, n. sp.
Figs. 4, 6, & 14

Long, rather slender, testaceous-brown, beneath with a pale spot at the base of each connexival segment, the first and second antennal segments darkened at apex. Length 10.5 mm.

Head with anteocular part 1.95 mm. long, postocular 0.75 mm. long; ventral interocular groove shallow, not longer than an eye; clypeus brown, longer than wide, slightly narrowed on lateral sides in front. Labium nearly reaching to the middle of postocular space. Length of antennal segments: I, 0.65 mm.; II, 1.05 mm.; III very



1. *Hydrometra intonsa* Drake & Hottes, ♀ lateral aspect.
2. *Hydrometra intonsa* Drake & Hottes, ♂ lateral aspect.

long and curled; IV, 1.65 mm. Forelegs with apex of femur slightly surpassing tip of clypeus; hind femur barely extending beyond genital segments.

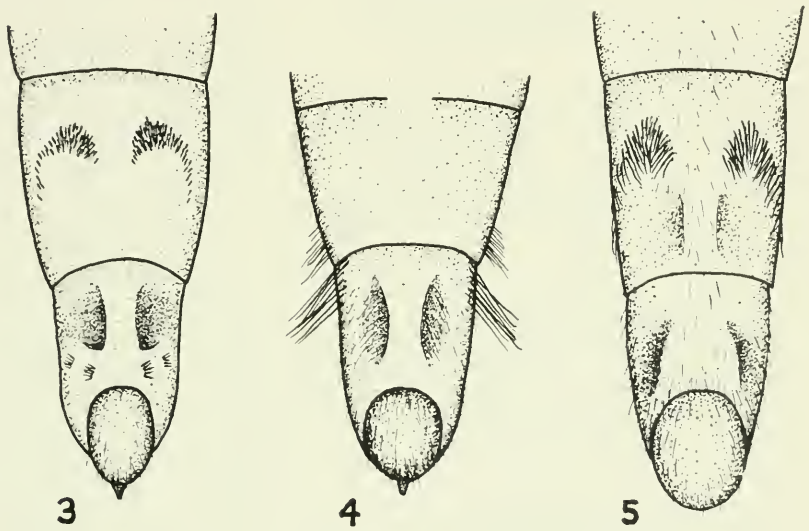
Pronotum 1:80 mm. long, with hind tobe twice as long as fore lobe, with median longitudinal pale line extending entire length of pronotum and scarcely impressed; front lobe impunctate, the collar set-off by an encircling row of moderately large pits; hind lobe with a row of pits on median line, with a very large number of pits on each side of median line. All acetabula with numerous pits, which are only feebly larger than those on the hind lobe of pronotum; fore acetabulum with 6 pits in front of cleft and 9 behind it, mid-

dle acetabulum with 6 pits in front of cleft and 10 behind it, hind acetabulum with 10 pits; propleuron with 13 pits; pits arranged as in illustration (fig. 14).

Hemelytra 4.00 mm. long, extending to base of seventh tergite; abdomen 5.50 mm. long, seventh tergite with tuft of very long hairs on each side near hind margin, the genital segment impressed on each side (figs. 4 & 6). Female and brachypterous forms unknown.

Holotype (male, La Union, El Salvador, 24. vii. 1957.

Separated from *H. intonsa* by the more numerous acetabular pits (figs. 13 & 14) and the arrangement of hairy vestiture on the



3. *Hydrometra caraiba* Guérin-Méneville, ♂ ventral aspect.
4. *Hydrometra ciliosa* n. sp., ♂ ventral aspect.
5. *Hydrometra exalla* n. sp., ♂ ventral aspect.

seventh ventrite and sides of first genitla segment (figs. 4 & 6). The second antennal segment and body are also longer than in *H. intonsa*.

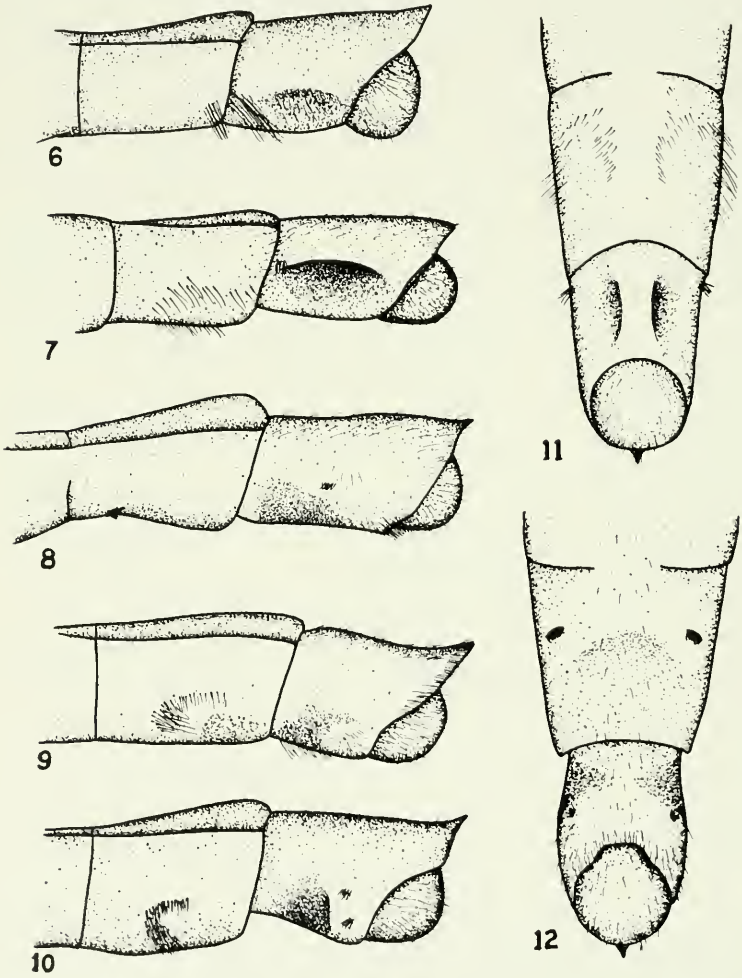
Hydrometra crossa, n. sp.

Figs. 7, 11, & 15

Brownish fuscous with head and apices of first two antennal segments dark fuscous; body grayish beneath with a wide, long, brown stripe on each side of abdomen and thorax. Length, 12.80 mm.

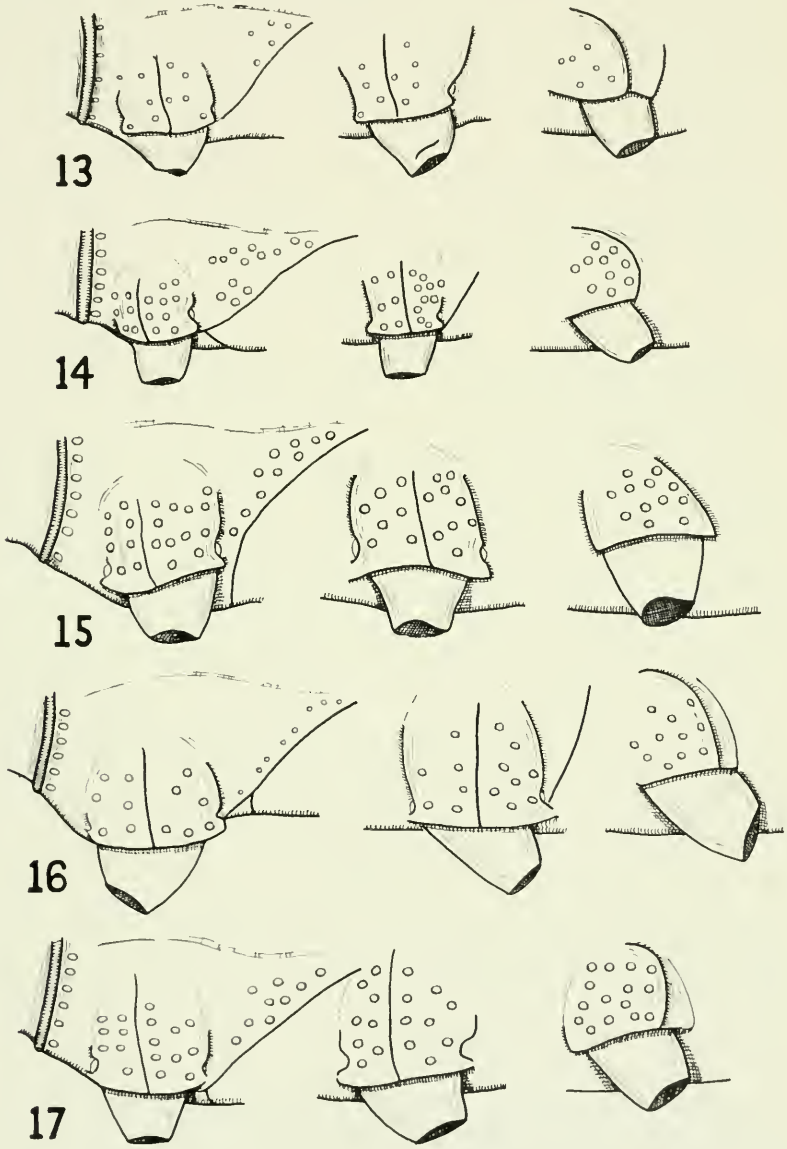
Head with anteocular length 2.50 mm. and postocular 1.05 mm.; ventral interocular sulcus short, not longer than eye; clypeus

blackish fuscous, longer than wide. Labium extending between the eyes. Antennal measurements: I, 0.55 mm.; II, 1.15 mm.; III very long and curled; IV, 2.00 mm. Anterior femur reaching to antenniferous tubercles, the hind femur barely surpassing last genital segment. Acetabular pits (fig. 15) large, sharply defined; anterior acetabulum with 6-8 pits in front of cleft and 9-11 behind it, middle acetabulum with 6-7 pits before cleft and 9-11 behind it, hind acetabulum with 12-13 pits.



6. *Hydrometra ciliosa* n. sp., ♂ lateral aspect.
7. *Hydrometra crossa* n. sp., ♂ lateral aspect.
8. *Hydrometra alloiona* n. sp., ♂ lateral aspect.
9. *Hydrometra exalla* n. sp., ♂ lateral aspect.
10. *Hydrometra caraiba* Guérin-Méneville, ♂ lateral aspect.
11. *Hydrometra crossa* n. sp., ♂ ventral aspect.
12. *Hydrometra alloiona* n. sp., ♂ ventral aspect.

Pronotum with front lobe nearly one-third the length of hind lobe, with the frosted median, longitudinal line extending its entire length; fore lobe impunctate, with collar demarcated by an encircling row of pits which are slightly larger than those on hind lobe;



13. *Hydrometra intonsa* Drake & Hottes, acetabular and propleural pits.
14. *Hydrometra ciliosa* n. sp., acetabular and propleural pits.
15. *Hydrometra crossa* n. sp., acetabular and propleural pits.
16. *Hydrometra alloiona* n. sp., acetabular and propleural pits.
17. *Hydrometra exalla* n. sp., acetabular and propleural pits.

propleural pits ranging from 6-10, feebly larger than those on hind pronotal lobe; hind lobe with the median frosted line impressed and provided with a row of pits, dark fuscous on each side of impressed line, with a very large number of pits on each side of median line. Abdomen 6.75 mm. long; elytra 5.25 mm. long, extending almost to middle of sixth dorsal tergite. First abdominal tergite provided beneath with very long hairs (figs. 7 & 11), the second segment impressed on each side. Female and apterous forms unknown.

Holotype (macropterous male) and 1 male *paratype*. Choluteca, Honduras, 20. vii. 1957.

Allied to *H. ciliata*, and easily separated from it by the position of the long hairs on the inferior side of the seventh abdominal tergite and the slightly shorter fore and hind femora.

Hydrometra alloiona, n. sp.

Figs. 8, 12, & 16

Brachypterous form.—Very long, brownish, grayish brown beneath, wing-pads with veins dark, appendages brownish testaceous. Length, 15.00 mm.

Head with anteocular part 1.75 mm. long, postocular part 1.10 mm. long; labium fuscous, reaching to the eyes. Antennae missing. Pronotum 2.30 mm. long with frosted, median, longitudinal front; fore lobe impunctate, one-half as long as hind lobe; hind lobe punctate on median line, with numerous pits on each side of it. Acetabula (fig. 16) with large pits; anterior acetabulum with six pits in front of cleft and eight behind it, middle acetabulum with 6 pits in front of cleft and 8 behind it, hind acetabulum with 11 pits. Propleuron with one row of eight pits, the pits a little smaller than those of the acetabula.

Abdomen 5.03 mm. long, the metathoracic wing pads barely reaching to base of the abdomen. Fore femora reaching considerably beyond the tip of the head, the hind femora extending much beyond last genital segments. Male genital segments with process as in illustrations (figs. 8 & 12).

Holotype (brachypterous male) from Estelli, Nicaragua, 9. vii. 1957. Female and alate forms unknown.

The mammiform processes of the male (fig. 8) are prominent and situated near the basal third on the inferior side of the sixth ventrite. The form and location of these structures will distinguish *H. alloiona* from related species.

Hydrometra exalla, n. sp.

Figs. 5, 9, & 17

Macropterous form.—Very long, brownish with posterior lobe of pronotum slightly testaceous, hemelytra mostly dark fuscous, and the sternum and head (except apex and base) black. Appendages brown. Length 15.00 mm.

Head with anteocular length 3.10 mm., the postocular length

1.20 mm.; ventral interocular groove not longer than eyes; labium extending between eyes. Antennal segments: I, 0.70 mm. long; II, 1.55 mm. long; III very long, twisted; IV, 2.35 mm. long. Anterior femur reaching apex of clypeus; hind femur extending slightly beyond apex of last genital segment.

Pronotum 2.40 mm. long, with an encircling row of fairly large pits near front margin; the median, pale, longitudinal line extending entire pronotal length; fore lobe impunctate, one-half as long as hind lobe; hind lobe with a row of pits in median, frosted line, with many pits on each side this line. Abdomen 7.75 mm. long; hemelytra 6.00 mm. long, with apices resting on basal part of sixth dorsal tergite. Propleura with 9 pits. All acetabula pitted; anterior acetabulum with 7 pits in front of cleft and 10 behind it, middle acetabulum with pits in front of cleft and 9 behind it, hind acetabulum with 15 pits (fig. 17). Male genital segments with brushes and other structures as in illustrations (figs. 5 & 9). Female unknown.

Holotype (macropterous male) Shapajilla, Peru, vi. 1939.

The male genital sturctures separates this species from *H. caraiba.* The acetabular pits are more sharply defined in *H. exalla.*

Hydrometra caraiba Guérin-Méneville

Figs. 3 & 10

Hydrometra caraiba Guérin-Méneville, 1856, *in* Sagra: Hist. phys. polit. et natur. de Cuba, p. 173.
Hydrometra caraiba Walker, 1873, Cat. Hem. Het., 8:152.
Limnobates caraiba Uhler, 1886, Check-List. Hem., p. 26.
Gerris caraiba Lethierry et Servin, 1898, Cat. Gen. Hem., 3:60.
Hydrometra caraiba Champion, 1898, Biol. Centr.-Amer. Rhyn., 2:124-125.
Hydrometra agenor Kirkaldy, 1902, Ent., 35:280-281.
Hydrometra agenor Kirkaldy & Torre-Bueno, 1909, Prov. Ent. Soc. Wash. 10(3-4):213.
Hydrometra caraiba Kirkaldy & Torre-Bueno, 1926, Ent. Amer. 7(1):102, 119-121.
Hydrometra caraiba Torre-Bueno, 1926, op. cit. 7(2):101, 113-114.
Hydrometra agenor Torre-Bueno, 1926, op. cit. 7(2):102, 124-125.
Hydrometra caraiba Hungerford & Evans, 1934, Ann. Mus. Nat. Hung. 28:90.
Hydrometra championiana Hungerford & Evans, 1934, op. cit. 28:91, 94, pl. X.
Hydrometra agenor Hungerford & Evans, 1934, op. cit. 28: 91, 101, pl. XI.
Hydrometra caraiba Drake, 1954, Great Basin Nat. 14(3-4):63-34.

This species was described from a single specimen collected in Cuba (Signoret Collection). As the type specimen of *caraiba* cannot be found in the Naturhistorisches Museum (Wien) nor in the Museum National d'Historie Naturelle (Paris), it is presumably lost. The writers are here designating a macropterous male from Cuba as the neotype, which is deposited in the U. S. National Museum.

Certain characters used in the original description have been quite helpful in identifying *caraiba.* These are as follows: 1), median longitudinal line with darkened area on each side of it; 2), very long body; 3), compound eyes placed at basal third of head; 4), and the comparative notes with the Old World *H. stagnalis* (Linnaeus). The length of *caraiba*, stated by Guérin-Méneville to

be 22 mm., would be longer than that of any species of the genus known to occur in the West Indies or even Central America, and probably this is a typographical error. In examining more than 300 specimens of *caraiba* from the Neotropical Region, our largest specimen is a female from Mexico, which is 18.6 mm. long. Males and females measuring from 16 to 18 mm. in length are not uncommon.

After examining the types of *H. championiana* Torre-Bueno in the British Museum, Drake (1934) synomyozed *championiana* with *caraiba*. There appears to be no question about this synonymy.

H. agenor Kirkaldy (1902) has not been recognized in the literature since it was originally described. According to the description, the type is a male, collected at Guayaquil, Ecuador, and is in Montadon's collection. The only example of *agenor* in the latter collection is a female bearing the locality label "Guayaquil, Ecuador" and specific label "*Hydrometra agenor* Kirk." in Kirkaldy's handwriting. In the Kirkaldy Collection (University of Kansas), there is also another female (badly mutilated), which bears the same labels plus a "type" label. These specimens were both collected at the same time by Dr. Francisco Camposo K. of Guayaquil. Th female specimen of *agenor* in the collection of Montandon is inseparable from *H. caraiba* and thus are synonyms. Since *caraiba* has priority by many years, it is the valid specific name of the species. We also have other specimens of *caraiba* from Quayaquil, which were collected a few years ago by Dr. Camposo K.

Specimens of *H. caraiba* have been examined from Cuba, Puerto Rico, Jamaica, Panama, Costa Rica, Guatemala, Mexico, Venezuela, Brazil, Peru, and Ecuador.

American Species of Hydremetridae Billberg, 1820

Genus *Bacillometra* Esaki, 1927

Type species, *Bacillometra ventralis* Esaki, 1927

1. *fualagana* Drake, 1946 ..... Peru
2. *mulfordi* (Hungerford), 1927 ..... Bolivia
3. *ventralis* Esaki, 1927 ..... French Guiana
4. *woythowskii* Hungerford, 1935 ..... Peru

Genus *Limnobatodes* Hussey, 1925

Type species *Limnobatodes paradoxus* Hussey, 1925

1. *paradoxus* Hussey, 1925 ..... Honduras

Genus *Hydrometra* Latreille, 1796

Limnametra Burmeister, 1835

Type species, *Cimex stagnorum* Linnaeus, 1801

1. *acapulcana* Drake, 1952 ..... Mexico, Nicaragua
2. *adnexa* Drake, 1956 ..... Panama
3. *aemula* Drake, 1956 ..... Mexico
4. *alloiona* Drake & Lauck ..... Nicaragua

5. *argenitna* Berg, 1879 ..... Argentina, Boliva,
   - *mensor* Buchanan-White, 1879 Brazil, Chile, Panama
   - *chilensis* Reed, 1901 Paraguay, Peru,
   - *kirkaldyana* Torre-Bueno, 1926 Trinidad, Uraguay,
   - *husseyi* Torre-Bueno, 1926 Venezula
6. *australis* Say, 1832 ..... Br .Honduras, Greater
   - *myrae* Torre-Bueno, 1926 Antilles, Mexico,
   U. S. (southern)
7. *barei* Hungerford, 1927 ..... (U. S. (Fla.)
8. *barrana* Drake, 1952 ..... Panama
9. *caraiba* Guérin-Méneville, 1856 ..... Brazil, Br. Guiana,
   - *championiana* Torre-Bueno, 1925 Columbia, Costa Rica,
   - *agenor* Kirkaldy, 1902 Cuba, El Salvador,
   Guatemala, Haiti, Honduras,
   Jamaica, Nicaragua,
   Panama, Venezuela
10. *ciliosa* Drake & Lauck ..... El Salvador
11. *comata* Torre-Bueno, 1926 ..... Trinidad
12. *consimilis* Barber, 1934 ..... Greater Antilles, Mexico,
   U. S. (Fla.)
13. *crossa* Drake & Lauck ..... Honduras
14. *cyprina* Torre-Bueno, 1926 ..... Mexico
15. *excella* Drake & Lauck ..... Peru
16. *exilis* Torre-Bueno, 1926 ..... Br. Honduras, Honduras,
   - *white* Hungerford, 1933 Mexico, Panama
17. *fruhstorferi* Hungerford & Evans, 1934 ..... Brazil
   - *brasilana* Drake, 1952
18. *fuanicana* Drake, 1954 ..... Brazil
19. *gibara* Torre-Bueno, 1926 ..... Cuba
20. *guianana* Hungerford & Evans, 1934 ..... Br. Guiana, Peru
   Venezuela
21. *huallagana* Drake, 1954 ..... Peru
22. *hungerfordi* Torre-Bueno, 1926 ..... Costa Rica, El Salvador,
   - *australis* Torre-Bueno, 1926 Guatemala, Nicaragua,
   - *australis* Hungerford, 1923 U. S. (southern)
23. *lentipes* Champion, 1898 ..... El Salvador, Guatemala,
   - *cordobensis* Torre-Bueno, 1926 Mexico
24. *intonsa* Drake & Hottes, 1952 ..... Mexico, Costa Rica
25. *lillianis* Torre-Bueno, 1926 ..... U. S. (Calif.)
26. *martini* Kirkadly, 1900 ..... Canada (southern), U. S.
   - *lineata* Say, 1832
   - *lineata* Martin, 1900
27. *metator* Buchanan-White, 1879 ..... Brazil
28. *naiades* Kirkaldy, 1902 ..... Panama
   - *mensor* Champion, 1898
29. *panamensis* Drake, 1953 ..... Panama
30. *placita* Drake, 1953 ..... Paraguay
31. *priscillae* Torre-Bueno, 1926 ..... Guatemala
32. *sztolcmani* Jaczewiski, 1928 ..... Guatemala
33. *taxcana* Drake & Hottes, 1952 ..... Costa Rica, Honduras,

34. *wileyi* Hungerford. 1923 ..... Mexico. U. S. (southern)
35. *williamsi* Hungerford & Evans. 1934 ..... Ecuador
36. *zeteki* Drake. 1952 ..... Columbia, Mexico. Panama

STUDIES IN THE WEEVILS OF THE WESTERN UNITED STATES NO. IX

DESCRIPTION OF A NEW SPECIES OF EUCYLLUS (COLEOPTERA: CURCULIONIDAE).[1]

Vasco M. Tanner
Professor of Zoology and Entomology
Brigham Young University

Eucyllus tinkhami, n. sp.
Fig. 1, A, B

Female: Rotund, body wall black, unicolorous due to being densely clothed with closely appressed roundish-shaped ash grey, scales short white setae on the disks of the head, prothorax, and elytra, pile on the scape, femur, prothorax, and humerus. Head broad and flattened; rostrum not distinctly separated, but gradually narrowed forward to the apex, slightly sulcate above; eyes convex and prominent; scrobes distinct and reaching the eyes; antennae robust, scape arcuate, passing over the eyes and beyond the front margin of the prothorax; first funicular segment robust, second segment slender and as long as segments three and four combined, club oval, reddish in color. Prothorax twice as broad as long, base arcuate sides strongly rounded, greatest width before the middle, apex emarginate, disk with shallow distinct punctures, each with a short decumbent white seta, long white pile on the anterior rounded margins of the prothorax. Elytra four-fifths as broad as long and one-third broader than the prothorax; ten finely impressed striae on each elytron, with small well placed punctures on the flat intervals, each with a short seta, humeri and along the margins of the elytra clothed with long white pile. Beneath scales similar to those on the elytra; second abdominal segment as broad as the third and fourth combined, femora and tibiae with long white pile. Corbels well developed on all tibiae; the combs consist of flat blunt reddish spinules, metathoracic corbel developed into a conspicuous spine-shaped structure. Length 5 to 7.1 mm., breadth 3-4 mm.

Type material: Female holotype, male allotype, and 23 paratypes. The holotype, allotype, and 8 paratypes are in the writer's collection at Brigham Young University, 7 paratypes in Ernest R. Tinkham's collection at Indio, California, 4 paratypes in the Entomological Collection of the United States National Museum, Washington, D.C., and 4 paratypes in the Entomological Collection of the California Academy of Sciences at San Francisco.

Type locality: Kelso Sand dunes, Devil Playground, 40 miles northeast of Amboy and 35 miles south of Baker in San Bernardino County, California. Collected by Dr. Ernest R. Tinkham at 9:30 p.m., May 23, 1959. I am pleased to name this species in honor of

1. Contribution No. 166.

Dr. Tinkham who for a number of years has been studying the fauna of the sand dunes of the Western United States.

Comments: In 1876 George H. Horn[2] established the genus

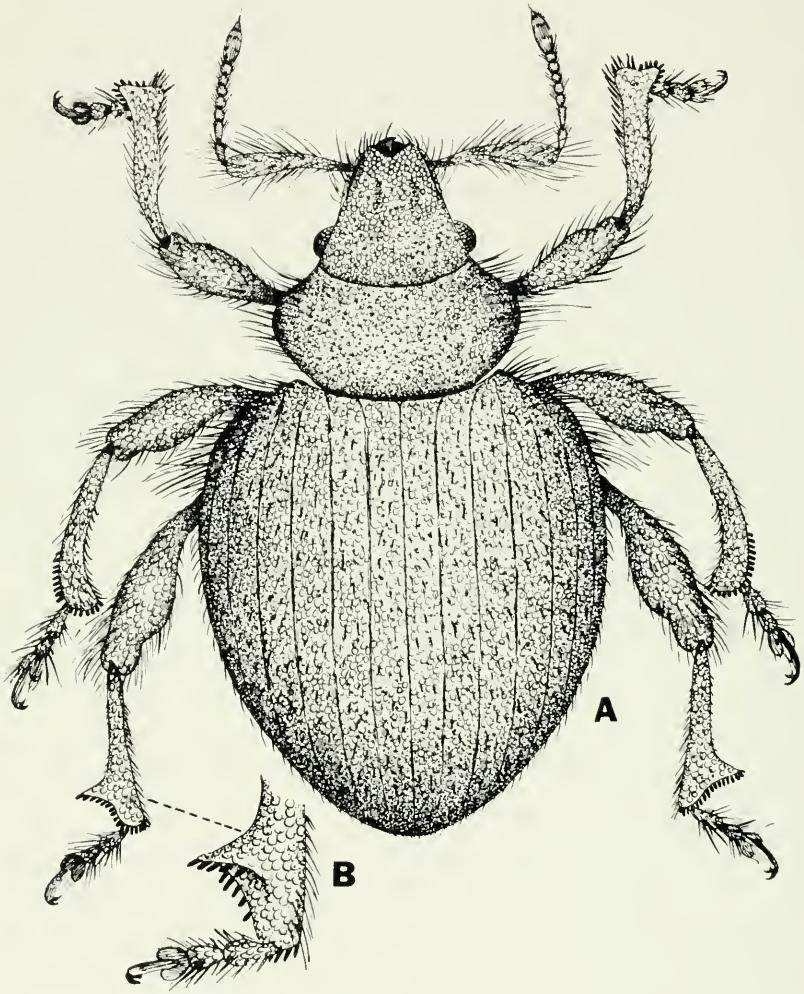


Figure I. A-Eucyllus tinkhami, new species. B-Corbel of metathoracic tibia.

Eucyllus with the species *vagans* as the genotype. This genus may be characterized as follows:

Mesopleural sclerites unequal, episternum large and attaining the elytra, epimeron small; first ventral suture arcuate; corbel surface of

2. Horn, George H. Otiorhynchidae in Rhynchophora of America. Proc. Am. Philos. Soc XV 1876, p. 74.

hind tibiae squamose; scrobes lateral, deep, attaining the eyes, not convergent; scape arcuate, passing beyond the anterior margin of the prothorax.

For sixty years this genus remained a monotypic one until 1936 when Dr. E. C. Van Dyke[3] described two additional species, *echinus* and *unicolor*.

Tinkhami as described in this paper may be included in the Van Dyke key as follows:

I. Larger species 5 to 7.5 mm. in length.
   a. Bicolored, elongate, second funicular segment from 3 to 4 times as long as broad, setae of entire upper surface hispid, many times as long as broad and acute at apices ..... *vagans*.
   b. Unicolored, rotund, first funicular segment robust, much broader and as long as the second segment; setae of upper surface white, short and decumbent; long white pile on the scape, femur, prothorax and humerus; corbels of hind tibiae well developed and squamous ..... *tinkhami*.

II. Smaller species 5 mm. or less in length.
   a. Bicolored, three brown stripes on pronotum and numerous brown patches on elytra, erect setae of upper surface clublike, several times as long as broad ..... *echinus*.
   b. Unicolored, cinereous, erect setae of upper surface peg-like or tubercular, but little longer than broad ..... *unicolor*.

Distributional notes: All the above species are represented in the Entomoligical collections at Brigham Young University as follows:

Vagans: 15 specimens from Horseshoe Island, Lake Mead, Nevada, collected by Vasco M. Tanner May 12, 1941; 1 specimen from "Mojava, California."

Tinkhami: 25 specimens from Kelso Sand dunes, Devil Playground, San Bernardino County, California, collected by E. R. Tinkham, May 23, 1959.

Echinus: 1 specimen from St. George, Washington County, Utah, collected by Angus M. Woodbury.

Unicolor: 1 specimen from Peach Springs, Arizona, collected by Ulke, 1896; 2 specimens from Arizona, collector not known; 2 specimens from the Virgin River, Washington County, Utah, collected by C. J. Weidt, 1892; 2 specimens from St. George, Washington County, Utah, collected by Angus M. Woodbury; 1 specimen from S.W. end of Cedar Mountains, Tooele County, Utah, collected by W. J. Thomas, VIII, 25, 1953.

3. Van Dyke, E. C., New Species of North American Weevils in the Family Curculionidae, subfamily Brachyrhtininae IV, The Pan Pacific Entomologist Vol. XII, No. 1, pp. 19-32, 1936.

NEW RECORDS AND SPECIES OF ARIZONA BARK BEETLES (COLEOPTERA: SCOLYTIDAE)

Stephen L. Wood[1]

Described below are four species of Scolytidae new to science. All were collected in Arizona by the writer during August, 1958. Of special interest is the record of the second Nearctic species of the Palaearctic genus *Liparthrum*; other new species belong to the genera *Pseudothysanoes*, *Hylocurus*, and *Morarthrum*.

Liparthrum arizonicum, n. sp.

This is the second Nearctic species in this Palaearctic genus. It is more closely allied to *squamosus* (Blackman) than to other known species, but may be distinguished by the larger size, by the more shallow, less distinctly impressed strial punctures, by the larger strial hairs, by the longer, broader, interstrial scales, and by the distinctly impressed, wider declivital striae and strial punctures.

Male.—Length 1.1 mm.; 2.1 times as long as wide; body color brown, the vestiture and antennae much lighter.

Frons feebly convex, slightly impressed above epistoma; surface minutely rugulose, without definite punctures; vestiture rather short and sparse, somewhat more conspicuous along epistoma. Eye oval, entire; finely granulate. Antennal scape longer than funicle; funicle four-segmented; club elongate-oval, devoid of indications of sutures except for a few setae at side margins.

Pronotum 0.7 times as long as wide; widest at base, sides arcuately converging toward the rather broadly rounded anterior margin; surface minutely rugulose, without definite punctures; anterior margin armed by two submarginal, very narrowly separated, slender teeth and behind these three successive submedian pairs of teeth. Vestiture consisting of almost equal numbers of rather short recumbent hairs and somewhat shorter semi-erect, broad scales.

Elytra 1.4 times as long as wide, 1.9 times as long as pronotum; basal margins each armed by a row of five subcontiguous rather large crenulations near scutellum, the most lateral crenulation at base of interspace four; sides straight and subparallel on basal three-fourths, broadly rounded behind; striae not impressed, the punctures rather large and close, but not sharply defined; interstriae narrower than striae, the punctures apparently rather large, but poorly defined; the general surface appearing obscured by an incrustation. Declivity convex, steep; striae somewhat narrower than on disc. Vestiture consisting of rows of rather short recumbent strial hair and rows of somewhat shorter, very broad interstrial

1. Department of Zoology and Entomology, contribution No. 160 Brigham Young University, Provo, Utah. Scolytoidea contribution No. 18

scales, each scale wider than long and separated from other scales in the same row by a space greater than the length of a scale.

Female.—Apparently identical with the male except: marginal teeth on pronotum absent and with the other pronotal asperities reduced in size and number. This character may be variable and possibly does not have secondary sexual significance; the sex could definitely be determined by segmentation of the abdomen in only a few of the specimens.

Type Locality.—Miller Canyon, Huachuca Mountains, Arizona.

Host.—Arbutus arizonicus.

Type Material.—The male holotype, female allotype and 42 paratypes were collected at the type locality on August 22, 1958, from small branches and twigs of the Arizona Madrone, by S. L. Wood. The galleries were of the simple cave type and, because of the extremely thin bark of the host tree, were engraved mostly below the cambium region. Eggs were deposited around the margins of the irregular cave without being placed in special egg niches. Larval galleries were short and irregular, not oriented in any way to the grain of the wood.

The holotype, allotype and some paratypes are in the collection of the writer, other paratypes are in the U. S. National Museum.

Pseudothysanoes spinura, n. sp.

This species is closely allied to *heliura* Wood, but may be distinguished, in the male, by the smaller size, by the slightly produced anteromedian margin of the pronotum which is armed by a pair of subcontiguous, larger marginal and a second pair of smaller submarginal teeth, by the shorter, more numerous scales on the circumdeclivital ridge, and by the presence of about six pair of rather long, coarse, pointed, spinose setae on the first declivital interstriae; and in the female by the smaller size, by the more narrowly impressed frons, by the more pubescent antennal scape, by the more slender pronotum, by the much smaller, less strongly impressed strial punctures, and by the less abundant, shorter elytral pubescence. This species is a bark borer; *heliura* is a wood borer.

Male.—Length 1.2 mm., 2.3 times as long as wide, appearing obliquely truncate behind; body color dark brown, lighter in the summit area of pronotum.

Frons very shallowly concave almost from eye to eye, largely concealed in all males at hand but surface evidently minutely rugulose as in the female; pubescence sparse, inconspicuous. Eye oval, entire; finely granulate. Antennal scape long, slender; club ovate, with two straight sutures.

Pronotum about as long as wide, widest one-third length from base; sides arcuate on basal half, subconstricted one-third of length from anterior margin; anterior margin moderately produced medially and armed by a pair of rather large subcontiguous teeth and by a second pair of smaller submarginal ones; summit area elevated, located at center of pronotum; vesiture largely abraided, consisting

of short scales in the posterior area, and longer stout setae in asperate area.

Elytra 1.5 times as long as wide; sides straight and apparently diverging slightly on basal three-fourths, broadly rounded behind; striae not impressed, the punctures small, distinct, not deep; interstriae wider than striae, the punctures finer than, but as numerous as those of striae, obscure. Declivity moderately steep, weakly convex, delimited by a circumdeclivital ridge as in *heliura*, the ridge acute on lower two-thirds of circle, rounded on upper third; strial punctures evident only above; interstriae one rather broad and armed on the lateral side by a row of about six long, coarse, pointed, spinelike setae, the shortest near the upper margin, the longest and lowest about two-thirds of the distance from upper margin, the longest and lowest about two-thirds of the distance from upper margin. Vestiture on disc consisting of rows of short, erect interstrial scales, and minute recumbent strial hairs; on declivity only the pairs of spines and minute strial hairs evident.

Female.—Length 1.35 mm., 3.0 times as long as wide; frons more narrowly and deeply impressed at center; scape ornamented by about 15 plumose hairs; antennal club more elongate; anterior margin of pronotum neither armed nor produced; pronotum 1.04 times as long as wide; strial and interstrial punctures somewhat smaller than in male; declivity evenly convex, with no trace of a circumdeclivital ridge; vestiture on disc and declivity as on disc of male.

Type Locality.—Oak Creek Canyon, Arizona.

Host.—An unknown shrub.

Type Material.—The male holotype, female allotype and 22 paratypes were collected at the type locality on August 20, 1958, by S. L. Wood, from an unknown shrub about 6 to feet tall. The shrub was common on the east-facing slope about 50 feet above (west) the highway and immediately south of the Wagon Wheel Motel. It grew in association with small oak trees. The galleries, both adult and larval, were constructed entirely in the cambium region.

The holotype, allotype and some paratypes are in the collection of the writer, other paratypes are in the U. S. National Museum.

Hylocurus femineus, n. sp.

A species near *effeminatus* Wood, but larger and, in the male, the transverse frontal elevation much larger, the tubercles at base of declivity smaller, the declivity shining, the ninth interstrae only feebly elevated and bearing granules to posterior extremity of elevated portion, and the vistiture at base of declivity slender, hairlike; and in the female, the frons flattened with the frontal pubescence more abundant, and the ninth declivital interstriae even more feebly elevated.

Male.—Length 2.5 mm., 2.6 times as long as wide; body color very dark brown, almost black.

Frons convex, moderately impressed below a coarse transverse elevation at upper level of eyes, the elevation bearing four or five indefinite coarse granules at summit; surface granulose; vestiture consisting of sparse inconspicuous, moderately long setae, more abundant along epistomal margin. Eye and antenna as in other representatives of the genus.

Pronotum 1.1 times as long as wide; widest posteriorly, the sides almost straight and subparallel on basal half, the anterior margin rather broadly rounded; summit indefinite, at center; asperate before summit, granulate behind without evident punctures; vestiture inconspicuous, consisting of sparse, short, hairlike setae, longer and more conspicuous at extreme basal margin.

Elytra 1.5 times as long as wide; sides straight and subparrallel on basal three-fourths, abruptly narrowed at declivital margin and terminating behind in a mucro that forms about a 90 degree angle; striae not impressed, the punctures rather coarse and deep; interstriae about as wide as striae, weakly convex, smooth and shining and bearing a row of rather fine shallow punctures, the punctures tuberculate near declivital margin. Declivity steep, similar to that of females of other *Hylocurus* of the *parkinsoniae* group; basal margin rounded; striae continuing to base of mucro, the punctures smaller than on disc; interstriae one and three moderately elevated, one bearing a series of about seven small pointed tubercles of equal size, three bearing about five tubercles the last two much larger, two impressed and smooth except for about two small tubercles at upper margin, the lateral interspaces each bearing three or four small pointed tubercles, the ninth interspace rather weakly elevated and bearing four or five tubercles, not narrowly carinate or projecting posteriorly as in most other *Hylocurus*. Vestiture hairlike, short on disc, longer toward declivity, and short on declivital face; all setae slender, no suggestion of being scalelike.

Female.—Similar to male except: frons flattened, the transverse elevation absent, frontal pubescence more abundant, longer, yellow; declivital tubercles slightly reduced, the ninth only feebly elevated; sexual differences in elytral vestiture not readily apparent.

Type Locality.—Miller Canyon, Huachuca Mountains, Arizona.

Host.—Juglans major.

Type Material.—The male holotype, female allotype and four paratypes were cut from the wood of a small Arizona walnut sapling about two inches in diameter, at the type locality on August 22, 1958, by S. L. Wood.

The holotype, allotype and two paratypes are in the collection of the writer, other paratypes are in the U. S. National Museum.

Micracis lignator Blackman

This species was known to the writer only from the original description at the time he described *truncatus* from Mexico. The description and the types of both species suggest that they are quite distinct from one another. However, a series taken by the

writer at Miller Canyon, Huachuca Mountains, on August 22, 1958, and compared to the allotype, demonstrates that Blackman's species is somewhat variable in the development of the interstrial tubercles at the declivital base. The maximum development of these Arizona specimens was about the same as the minimum development of the same tubercles in *truncatus*. The only apparent real difference between these forms appears to be in the smaller, more slender scales on the margin of the declivity in *lignator*. Perhaps when sufficient material in this group is available from northern Mexico it will be possible to determine whether one or two species should be recognized.

As was the case with the type series of *truncatus*, the Miller Canyon specimens were taken from small oak branches about one and one half inches in diameter, in association with *Micracisella knulli* (Blackman).

Monarthrum huachucae, n. sp.

This species is very closely allied to *scutellare* Leconte, but differs, in the male, in having the acutely elevated lateral declivital margins extending much higher on the declivity and in having the two pair of teeth at the top of the declivity closer together and closer to the suture; in the female, the frons more narrowly carinate on lower half and bearing a pair of rather large subcircular pubescent areas on each side of the carina, the upper portion of the frontal area more finely, deeply punctured, the posterior face of the antennal club bearing a tuft of long hair, and the sutural striae on declivity more narrowly and deeply impressed.

Male.—Length 3.5 mm., 3.1 times as long as wide; body color brown, the elytra somewhat lighter on basal half.

Frons convex, transverse epistomal elevation as in *scutellare;* surface minutely rugulose and dull below, becoming almost smooth and shining above eyes, the punctures small, deep above and shallow to obscured below. Eye as in *scutellare*. Antennal club similar to that of *scutellare* except the sutures more strongly arcuate.

Pronotum 1.6 times as long as wide; sides straight and subparallel on basal two-thirds, rather broadly rounded in front; finely asperate on less than the anterior half, surface minutely reticulate and dull on more than posterior half and very finely shallowly, sparsely punctured.

Elytra 1.8 times as long as wide, 1.4 times as long as pronotum; sides straight and subparallel on basal three-fourths, the posterolateral declivital margin forming the abrupt, broadly rounded posterior outline, the sutural notch acute; striae not impressed, scarcely visible, the punctures minute, shallow; interstriae flat, minutely and irregularly punctured, dull. Declivity oblique, excavate, beginning two-thirds of distance from base, the lateral margins acutely elevated as in *scutellare* and inscribing at least two-thirds of complete circle, the costae ending abruptly above in an

obtuse angle that may be tuberculate medially; upper margin between costae rounded and armed by two pair of teeth, the median pair smaller, the distances from suture to first tooth, first to second tooth, and second tooth to base of costa all about equal; declivital face as in *scutellare*, with numerous very minute, shallow punctures. Vistiture sparse and short on sides, near declivity, and on declivital face; longer and much more abundant along inner face of declivital costae; disc glabrous.

Female.—Similar to male except: lower half of frons bearing a patch of long, slender, yellow pubescence partly divided by an obtuse low carina, each pubescent area roughly circular in outline; posterior face of antennal club bearing a tuft of long hair (mostly on posterior portion), some hairs extending a distance equivalent to more than half the length of the club from the tip; declivity steeper, without lateral costae, acutely margined only on lower margin, face more strongly convex than *scutellare* with a narrow median sulcus and the suture narrowly, weakly elevated, armed by three pair of minute, pointed tubercles on upper half at margins of sulcus as in *scutellare*.

Type Locality.—Miller Canyon, Huachuca Mountains, Arizona.

Host.—*Quercus* sp.

Type Material.—The male holotype and female allotype were collected at the type locality on June 29, 1907, by H. A. Kaeber. One male paratype was taken at the same locality on August 22, 1958, by S. L. Wood, from the base of an oak tree about six inches in diameter. One female paratype was taken four miles southwest of Forestdale, Navajo Co., Arizona, August 23, 1952, by H. B. Leech and J. W. Green.

The holotype and allotype are in the U. S. National Museum, the paratypes are in the collections of the California Academy of Sciences and of the writer.

Monarthrum dentiger (Leconte)

Specimens of this California species have been collected in Arizona, but have not been reported from that state. This writer has examined three specimens taken two and a half miles west of Harshaw in the Patagonia Mountains, Santa Cruz Co., Arizona, August 2, 1952, by H. B. Leech and J. W. Green.

DESCRIPTION OF A NEW TENEBRIONID (COLEOPTERA) FROM GLEN CANYON, UTAH

Edward B. Sorenson and Robert C. Stones[1]

In 1935 Frank E. Blaisdell Sr. described a new genus and species of Triorophid (*Eschatomoxys wagneri*)[2] from a single male specimen collected in Death Valley, California in 1922. The female was not discovered. Since then no other known specimens of this genus have been found.

In a recent expedition to Glen Canyon, Kane County, Utah. fifteen specimens of this genus were collected. After a careful study of Dr. Blaisdell's excellent drawings and description and a report from Mr. Hugh Leach of the California Academy of Sciences who compared one of our specimens with the type of *wagneri* we are of the opinion that the specimens from Glen Canyon area represent a new species, which we venture to describe.

Eschatomoxys tanneri,[3] n. sp.

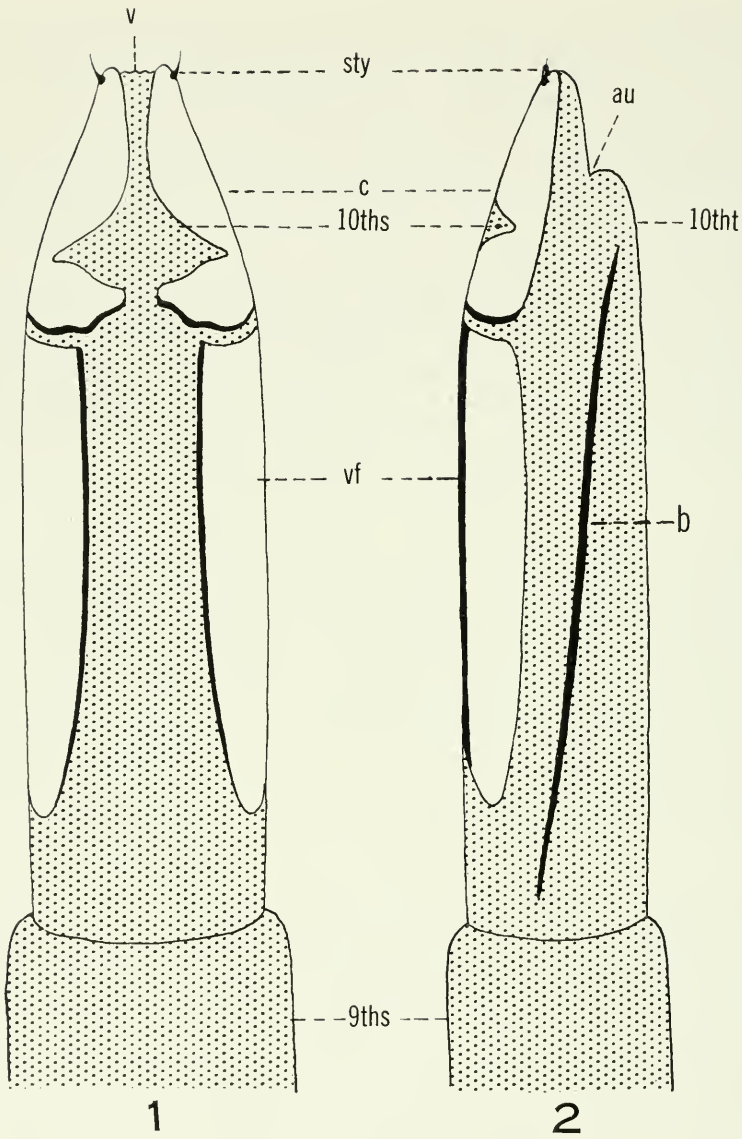
Figs. 1 and 2

Male.—Body length 9.0 mm; body width 3.6 mm; form oblong ovate two and one-half times longer than wide; surface feebly alutacious; color castaneous, antennal segments becoming progressively lighter distally; labrum, maxillary palps and posterior ventral abdominal segments testacious; luster dull, body covered with a light blue bloom in nature; head slightly longer than wide (1/23), one-eighth longer than pronotum; epistome deeply emarginate; antennae with first segment about three times as long as wide at apex; second one-tenth longer than fifth and one-tenth smaller than combined lengths of nine and ten; fourth longer in length than the sixth, seventh or eighth; tenth twice as wide at apex as middle of eighth; eleventh about three times as long as wide at middle, and one-eighth shorter than eighth; pronotum widest in middle, one-fourth wider than long, apex and base same width; elytra slightly over one-third longer than wide, base about one-eighth wider than base of pronotum; abdomen with second segment somewhat more than twice as long as fourth and almost one-third longer than third.

Female.—Body length 9.2 mm.; body width 2.8 mm.; head one tenth longer than wide.

In body length, head and pronotum measurements, the smallest female is equal to the average male; while in body width and elytra measurements, the smallest female is larger than the average male. Abdominal measurements find the average female larger in the first three segments, equal in the fourth to males.

1. Graduate students of Entomology and Ecology, respectively; Zoology and Entomology Department contribution No. 168, Brigham Young University, Provo, Utah.
2. *The Pan-Pacific Entomologist*, Vol. 11 pp. 125-29, San Francisco, California, 1935
3. In honor of Professor Vasco M. Tanner, Brigham Young University Entomologist



Figures 1 and 2. *Eschatomoxys tanneri*, new species. Ventral and lateral aspects of the female genitalia.

ABBREVIATIONS

sty	stylus	9ths	ninth sternite
c	coxite	10tht	tenth tergite
vf	valvifer	10ths	tenth sternite
au	anus	b	baculum
v	vulva		

Since this is the first time that a female of this genus has been studied, we are including drawings of the genitalia, Figures 1 and 2. The general characters of this species agrees with other genera of the tenebrionids. The stylus is very small as in other members of this family.[4,5]

Type Material: Male holotype, female allotype and 13 paratypes (ten males, three females). The holotype, allotype and 8 paratypes in Collection at Brigham Young University. 3 paratypes in the Entomological Collection of the California Academy of Sciences and 3 paratypes in the Entomological Collections of the United States National Museum, Washington, D. C.

Type Locality: Head of Padre Creek Canyon, approximately two miles above the "Crossing of the Fathers" on the Colorado River. The head of this canyon is very shallow, approximately twenty-five feet deep. The jeep road into the "Crossing of the Fathers" and Kane Creek area, branching from the main highway at Wahweap, makes a horseshoe bend around the head of this canyon. A majority of the new terebrionids were collected within fifty yards of this road in a sandstone detrital deposit. Weather was very dry and hot; temperatures exceeding the 100 degree mark. Collecting was done from 8:00 a.m. until noon. Even this late in the day, the area of collecting was still in the shade of the overhanging canyon wall.

Paratype variations: The description of *E. tanneri* was made with the awareness that variations of certain structures in this group exist. Specimen measurements were taken in millimeters as follows:

9 males: total length 8.1-9.6, average 8.6; width 3.3-3.8, average 3.6; head length 1.6-2.0, average 1.7; head width 1.5-1.8, average 1.6; pronotum length 1.3-1.6, average 1.4; pronotum width 1.7-2.0, average 1.8; elytra length 5.0-5 8, average 5.3; elytra width 3.3-3.8, average 3.5; abdomen average first segment 1.2, second segment .9, third segment .7, fourth segment .4.

3 females: color castaneous to testaceous; total length 8.6-11.0, average 9.7; width 3.6-4.3, average 3.8; head length 1.7-2.2, average 1.9; head width 1.6-1.9, average 1.8; pronotum length 1.4-1.8, average 1.6; pronotum width 1.8-2.3, average 2.0; elytra length 5.5-6.7, average 6.1; elytra width 3.6-4.3, average 3.8; abdomen average first segment 1.3, second segment 1.1, third segment .8, fourth segment .4. The tibial and femoral variations are so great that they are not listed herein.

Comparisons between E. tanneri and E. wagneri: *tanneri*, body two and one-half times longer than wide, *wagneri*, twice as long as wide; *tanneri*, head slightly longer than wide, *wagneri*, one-sixth wider than long; *tanneri*, first antennal segment three times as long as width at apex, second six times as long as wide at middle, fourth longer than sixth, seventh or eighth, tenth twice as wide

4. Tanner, V. M. A Preliminary Study of the Genitalia of Female Coleoptera. Trans. Am. Ento. Soc., LIII pp. 5-50. Plates II-XV. 1927.

5. Blaisdell, F. E. Studies in the Tenebrionid Tribe Scaurini A Monographic Revision of the *Eulabes*. (Coleoptera). Trans. Am. Ento. Soc., LVIII. pp. 35-101. Plates I-VI. 1932.

at apex as middle of eighth, eleventh one-eighth shorter than eighth, three times as long as wide at middle; *wagneri*, first segment five times as long as wide at apex, second six times as long as wide at middle, equal in length to fifth as well as combined length of ninth and tenth, fourth is equal in length to sixth, seventh or eighth, and seven times as long as wide at middle, tenth three times as wide at apex as middle of eighth, eleventh four times as long as width at middle, as long as eighth; *tanneri*, epistome deeply emarginate from above, *wagneri*, epistome very slightly emarginate; *tanneri*, pronotum widest in middle, one-fourth wider than long, base and apex same width, *wagneri*, widest slightly before middle, one-third wider than long, apex a little wider than base; *tanneri*, elytra base one-eighth wider than that of pronotum, *wagneri*, base equal to that of pronotum.

Habitat: All specimens, with the exception of two, were taken from a one-fourth inch fissure that separated a detrital deposit (length twenty feet) from the canyon wall. The deposit was perforated with numerous vacated rodent tunnels; habitat cool, dry and subterranean. Thirteen specimens were taken from this site and two additional specimens taken one-eighth mile down the canyon in a deserted cliff-swallows nest. Due to the habitat, nutritional materials might well include fungi or dried fecal waste. A northwest facing with an overhanging canyon wall provided protection from the sun and rainfall, thus creating a cool, dark habitat ideal for these subterranean insects. This area is a vast, arid region of the Colorado River Drainage in extreme Southeastern Utah. Elevation 3200-3400 feet above sea level. Rugged gorges cut deep into sandstone by seasonal runoffs characterize the area.

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TAXONOMIC NOTES ON NORTH AMERICAN BEEFLIES, WITH DESCRIPTIONS OF NEW SPECIES

(Diptera: Bombyliidae)

D. Elmer[1] and Lucile M. Johnson

A number of genera and species of North American beeflies are evidently little known in collections and have received too little attention from taxonomists to be adequately described in the literature. Availability of material in some of these groups, together with a study of type material, permits elucidation of several of the described species and descriptions of two new ones. Opportunity is also utilized to rename a homonym created in an earlier paper. Location of material studied is listed under each species discussed below.

Amphicosmus arizonensis, n. sp.

(Figs. 4, 6, 7)

Similar to *A. elegans* Coq., but lacks the pollinose stripes on mesonotum. Length 7-9 mm.

Male.—Head black, cheeks and posterior oral margin nearly white; front, sides of face, and occiput silvery white pubescent, middle of face and extreme vertex shining black; front and occiput sparsely short white pilose; ocelli yellow. Antennae wholly black, lightly pollinose; first two segments sparsely short white pilose; first segment slightly cup-shaped, about two-thirds as long as wide; second segment about two-thirds as long as wide; third segment long-tapering, oval, widest at basal third, about one and one-third times as long as first two combined.

Thorax shining dark brown to black, two silvery white pubescent patches on each side: anterior patch occupies upper part of pro- and mesopleura and antero-lateral portion of mesonotum to a little caudad of transverse suture (mesad margin of this patch is angulate); posterior patch occupies the ptero-, meta-, and hypopleura; mesonotum and scutellum sparsely white pilose, a few fairly long white hairs on metapleura.

Legs brown, yellowish at the joints; lightly pubescent, sparse pile and weak, hairlike spines white.

1. Associate Entomologist, Ecological Research, University of Utah, Dugway, Utah.

Wings hyaline; veins yellowish, darkening distally; basal costal setulae nearly white. Halteres nearly white.

Abdomen laterally compressed; first tergite brown, posterolateral margins broadly yellowish; second tergite brown basally, lateral and posterior margins broadly yellowish brown; third, fourth, and fifth terga yellowish brown, with dark brown forming patches on the sides of the third and fourth and a saddle on fifth; remaining terga and genitalia dark brown; visible part of venter mostly yellow; first and most of second, third, and fourth terga shining; dorsal patches on second, third, and fourth, and all of remaining terga silvery white pollinose when viewed from in front; short, sparse pile nearly white.

Female.—Much larger and more robust than male. Front only very narrowly pubescent along orbits; lower lateral corners of front, sides of face, cheeks, and lower occiput pale yellow. Anterior and posterior callosities and upper part of mesopleura yellow; anterior pubescent patch on thorax much less extensive than in male. Legs with much more yellow. Abdomen almost wholly yellowish red, only the first basally and the sixth and seventh terga wholly except their hind margins brown. Pile of first and on hind margins of rest of terga and on venter pale yellow, rest of pile of abdomen dark brown to black; venter sparsely white pubescent. On sides of third and fourth terga are circular patches of closely spaced, tiny circular dark brown pits.

Types.—Holotype male and *allotype* female, Tucson Mountains, Arizona, August 16, 1955 (G. D. Butler). *Paratypes.*— 2 ♀ Continental, Arizona, July 15, 1940 (D. E. Hardy). A badly broken female and a headless male bear the same collection data as the paratypes. Another broken female bears the data Courtland, Arizona. August 12, 1940 (C. D. Michener). The holo- and allotypes and one paratype are in our collection, the other specimens are in the Snow Entomological Museum at the University of Kansas.

Under magnification of 216 powers the pubescence found on these flies appears to be composed of fine, narrow, hairlike scales rather than the granular pollinose vestiture frequently found in like situations. The tiny pits on the third and fourth terga of the female have not previously come to our attention.

Desmatoneura argentifrons Williston

Williston[2] described this species from a single male specimen from Albuquerque, New Mexico. Melander[3] described the female from a single Utah specimen. We have not often encountered the species in collections, but it cannot be considered rare—simply another case wherein collectors have not been present during the flight period of the species, or have overlooked this small, inconspicuous fly. In the dunes of the Western Utah deserts we have at times found them to be very common.

In studying a long series of specimens in our collection from

2. Williston, S. W., Kans. Univ. Quart. III, 267, 1895.
3. Melander, A. L., Pan-Pac. Ent. XXVI, #4, 153, 1950.

a single population (approximately 100 specimens from the dunes on the eastern edge of Dugway Valley, Tooele County, Utah) we have found this species to exhibit considerable variation, particularly in size and ground color of the body. Our largest specimen is nine millimeters in length, our smallest, four and one-half. There has been no apparent correlation between size and season, all sizes being present at any given time. More of the very small specimens are female than male, but so also are more of the very large ones.

Ground color of the head and thorax remains quite constant. But the ground color of the abdomen and legs varies quite remarkably, particularly among the larger females. We have seen females that are all dark brown except the seventh segment and the knees. In contrast to this we have seen specimens which have only the middles of the fore femora dark, the abdomen and the rest of the legs being yellowish brown to yellow. Many of the specimens have varying degrees of intergradation between these two extremes. Degree of paleness in the abdomen appears to progress from caudad forward, and from the venter dorsad, there apparently being no cases of reversal of this order. In the legs the dark color disappears first from the tibiae, and progressively from the two ends of the femora, from the middle, to the hind, to the fore-legs. Most of the very small specimens of both sexes are dark; most of the very pale specimens are large.

Color of the wings varies from the condition as described by Williston, in which a fairly definite band is present, to a condition in which there is little or no color in the wing save in the costal cell, which appears to be always at least partically yellow. The males usually have darker wings than the females. The larger specimens usually have more color in the wing than the small.

The color of the tomentum varies less than the ground color of the body, but is not always constant. Always the tomentum of the dorsum is darker than that of the pleura and venter. Usually that of the hind margins of the scutellum and first abdominal segment is white or nearly so. Often the hind margins of the other terga are bordered with paler scales, particularly on the sides, but there are specimens in which this tomentum is completely concolorous.

Dicranoclista Bezzi

In 1894 Coquillett[4] announced the discovery in North America of the genus *Spogostylum* Macquart, and described *Spogostylum vandykei* from California. However, the third submarginal cell of *Spongostylum* (*Spogostylum* of authors) is formed by a cross-vein uniting veins R_{2+3} and R_4 rather than veins R_4 and R_5 as is the case with Coquillett's species. Therefore Williston[5] removed this species from the genus *Spongostylum* and erected the genus *Coquilettia* to receive it. This name is preoccupied (Uhler, 1891)[6] and is, there-

4. Coquillett, D. W., Trans. Am. Ent. Soc. XXI, 94, 1894.
5. Williston, S. W., Manual of North American Diptera, 65, 1896.
6. Uhler, Tr. Maryland Ac. Sc., 79, 1890.

fore, not available. In 1924 Bezzi[7] erected the genus *Dicranoclista* to receive the Ethiopian species *Dicranoclista simpsoni*, speculating at the time that Coquillett's species might be congeneric. According to Bezzi's description and figure, *Dicranoclista simpsoni*, the genotype, which we do not know in nature, bears no tomentum on the abdomen, and cell R_5, or the first posterior cell, is closed and petiolate. Coquilett's *Spogostylum vandykei* bears sparse hair-like tomentum on the abdominal dorsum and cell R_5 is narrowly open. Other characters mentioned by Bezzi in his description of the genus *Dicranoclista* fit our present North American species well enough. We do not believe these two character differences to be of sufficient importance to bar the American species from inclusion in the genus *Dicranoclista* Bezzi, and the junior writer, following the suggestion of R. H. Painter, so indicated in her study of the beeflies of Utah[8].

In his Families and Genera of North American Diptera, Curran[9] ignored this genus. In his work this genus keys to *Anthrax* Scopoli, which it resembles in many respects, particularly in the nature of the antennae. But the peculiar wing venation of *Dicranoclista* readily separates the two genera.

Dicranoclista vandykei Coquillet
(Fig. 1)

Coquillett's types are in good condition in the U. S. National Museum. In addition to being mixed up on the sexes, he failed to mention the fact that the abdomen of the male is broadly reddish brown at the sides, and bears, under the black hairs of the caudal several segments, some black hair-like tomentum which, being the same color as the shining surface, is difficult to see.

In the case of the males, especially, this is a very handsome species. The broadly red sides of the abdomen are covered with long, dense, brightly orange pile, while the central black area is covered with shorter, finer, less dense, mostly black pile which forms a triangle with its broad base on the third tergite and its apex on the seventh. There are a few long, very slender scales on the hind margin of the first tergite, and a few short, hardly visible black scales on the second. In general appearance this species is reminiscent of the more highly colored individuals of *Villa fulviana* (Say).

Although evidently quite rare, this species is wide spread. In addition to the California types we have examined specimens from Utah and Texas. The latter material, lent by the University of Kansas, was compard directly with Coquillett's types and was found to be identical in all characters studied.

Dicranoclista fasciata, n. sp.
(Figs. 2, 3)

Mostly dark brown, pile mostly pale yellow, narrow fasciae of tomentum on hind margins of tergites. Length 10-12 mm.

7. Bezzi, Mario, Bombyliidae of the Ethiopian Region, British Buseum (N. H.), 178, 1924.
8. Maughan, Lucile, Jour. Kans. Ent. Soc., VIII, 34, 1935.
9. Curran, C. H., Families and Genera of North American Diptera. Ballou Press, 1934.

Male.—Head black, a narrow area of yellow around each antenna. Pile of vertex and front moderately dense, black, that of occiput and face yellow, a few black hairs on the epistoma; tomentum of head yellow, sparse and short on occiput, somewhat more dense on lower front and lower face, the latter quite long. Antennae short, the slender styliform part of the third segment about one and one-fourth times as long as the globular base; pile of first two segments short, black, a few yellow hairs on lower outside one-fourth. Proboscis does not project beyond the epistoma; palpi brown, very short; sparse hair yellow.

Mesonotum shining, pleura faintly gray pollinose. Pile of thorax pale yellow, of collar and pleura long and dense, of mesonotum and scutellum short, sparse; macrochaetae pale yellow, the scutellar bristles rather weak.

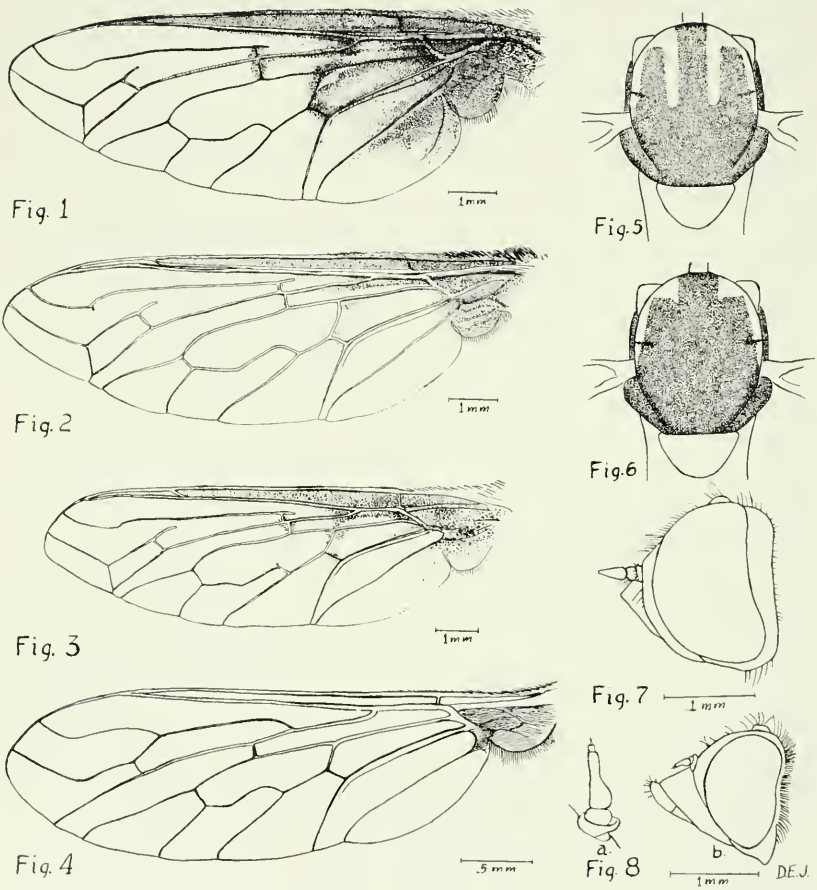
Coxae and femora brown; tibiae and tarsi brownish yellow, the latter darkening distally. Pile and tomentum of coxae grayish yellow; tomentum of rest of legs grayish yellow to brown, pile and bristles black.

Wings hyaline; base, costa, and subcosta yellow, small brown clouds at base of R_{2+3}, on the r-m, cross-vein, on bases of M_3 and Cu_1, and in the middle of cell R. Veins yellowish brown basally, darkening distally; basal costal setulae black, tomentum pale yellow to brown. Halteres light brown, the knobs pale yellow. There is a long spur on the angles of R_{2+3} and R_4. Vein R_4 is sharply angulate near its middle and a cross-vein joins this vein at the angle to R_5 near the margin of the wing to form a second cell R_4. Median cross-vein angulate with very short spur extending into cell $1M_2$.

Abdomen dark shining brown, the sides narrowly and the venter brownish yellow. Pile pale yellow, very slightly darker on sides; moderately long and dense on sides, shorter and sparser in middle of dorsum, very sparse on venter. A few very long, slender scales on hind margins of rest of terga except seventh, white on second, fifth and sixth, and sides of third and fourth, black in middle of third and fourth and a few on fifth; black, decumbent narrow scales on dark areas of second to sixth terga are almost invisible against shining nearly black background. Genitalia fairly prominant, red, the cerci edged with dark brown.

Female.—Very much like the male. Lacks the areas of yellow ground color around the antennae. Face and front quite densely pale yellow tomentose and pilose; occiput with much more tomentum than male, that on the posterior orbits being quite dense. Pile of fore and middle femora pale yellow. Wings almost wholly hyaline; vein R_{2+3} obtusely angulate at about its distal sixth, with a very short spur extending into cell R_3. Sides of abdomen more narrowly yellow than male. Abdominal venter with considerable pale yellow tomentum.

Types.—*Holotype* male: Cedar Creek, Arizona, 15 miles west of Ft. Apache, June 21, 1957 (G. Butler and F. Werner). *Allotype* female: Provo, Utah County, Utah, July, 1933 (D. E. Johnson). The specimens are in our collection.



Explanation of Plate

Figure 1. *Dicranoclista vandykei* Coquillett, wing of male homotype.
Figure 2. *Dicranoclista fasciata*, new species, wing of allotype.
Figure 3. *Dicranoclista fasciata*, new species, wing of holotype.
Figure 4. *Amphicosmus arizonensis*, new species, wing of holotype.
Figure 5. *Amphicosmus elegans* Coquillett, dorsum of thorax.
Figure 6. *Amphicosmus arizonensis*, new species, dorsum of thorax.
Figure 7. *Amphicosmus arizonensis*, new species, profile of head of holotype.
Figure 8. *Exepacmus johnsoni* Coquillett: a) dorsal aspect of antenna, b) profile of head of allotype.

The fasciae of scales on the hind margins of the abdominal segments of this species will readily distinguish it from *D. vandykei* Coq. It might be of interest to note that the allotype was picked up as it rested on a twig one morning before sunrise, near the tent where we were camped in the woodland along the Provo River. The site is now in the 800 block west on 1020 North Street, now a residential section of Provo, Utah.

In the junior writer's 1934 study this specimen was misidentified and reported as *D. vandykei* Coq.

Exepacmus johnsoni Coquillett

(Fig. 8)

Records of only two specimens of the genus *Exepacmus* have so far made their way into the literature. The first, a female from California, is in rather poor condition in the U. S. National Museum. It is the type specimen for Coquillett's (Op. cit. p. 101) *Exepacmus johnsoni*, which species is the genotype of his genus. The other specimen, also a female from California, is in the collection of Dr. A. L. Melander, and is the type of his species *Exepacmus nasalis*.

Melander (Op. cit. p. 152) separates his species from that of Coquillett on the basis of the differences in ground color of face, base of antennae, and femora, and states that the face of his species is apparently more protuberant that than of *E. johnsoni*, and notes that Coquillett does not mention an antennal depression such as *E. nasalis* has. We have not seen *E. nasalis* Melander, but aside from the differences in ground color, we found his description to fit very well, even including the "nasal groove," the parts of Coquillett's type which remain intact.

At Inyokern, California, the senior writer collected six specimens belonging to this genus, three males and three females. One of the females was about seven millimeters in length, and fit very well Coquillett's description of *E. johnsoni*. The other five specimens are about five millimeters in length. One small female is mostly dark in ground color, and except that the face and lower front are yellow and the pile of the front yellow on the area of yellow ground color, is like the larger specimen. The other small female has much yellow on head and thorax. We find no morphological differences between the large and the small specimens. Two of the males are almost wholly dark in ground color, the other has some yellow. There are no morphological differences apparent.

In view of the large differences in size and ground color exhibited by the specimens studied from the single population of *Desmatoneura argentifrons* Williston reported above, and inasmuch as all six of these specimens were collected in the same small area on the same day we are inclined to believe that *Exepacmus johnsoni* Coquillett and *Exepacmus nasalis* Melander are one and the same species.

The male may be described as follows:

Male.—Head densely white pollinose, front and face shining silver when viewed from above; ground color of front and face pale yellow, oral margin nearly white. Pile of head pale yellow, short, fairly dense on occiput, sparse on front and face, the latter very fine. Face strongly and sharply projecting, face and front divided by a marked impression. Proboscis dark brown, hardly projecting from beyond the pointed epistoma. First antennal segment cup-shaped, about one-third as long as wide; second segment about one-half as long as wide, contained for nearly one-half its length within the cupped first segment; third segment nearly twice as long as first two combined, the basal half broadly tapering, the apical half blunt, its sides nearly parallel, bearing a short blunt style with short stigma; a few short pale hairs on first and second segments.

Thorax brown, densely cinereus pollinose; tomentum and short sparse pile of mesonotum and scutellum pale yellow, of pleura white or nearly so; macrochaetae pale yellow; halteres yellow; wings hyaline, veins yellowish brown, darker distally.

Tibiae and apices of coxae and femora yellow, rest of legs brown; fairly dense tomentum of legs pale yellow to nearly white, spines black.

Abdomen subcylindrical, brown, narrow hind margins of segments paler; tomentum dense, that on dorsum pale yellow, on venter nearly white; pile dense on sides of first, sparse on rest of segments, nearly white. Genitalia yellowish; basi-styli pollinose, without hairs, largely hidden from view by rounded corners of ninth sternum, which bear five or six heavy spines on each side which interlock behind.

Allotype.—Male, Inyokern, Kern County, California, April 28, 1945 (D. E. Johnson). *Paratypes*: 2♂ same data.

The allotype and one paratype are in our collection. The other paratype is in the collection of R. H. Painter.

Exoprosopa painterorum, new name

On page 76, volume XVIII, numbers 3-4, of this periodical, dated December 31, 1958, we described *Exoprosopa cingulata* as a new species. Dr. R. H. Painter drew our attention to the fact that in 1885 van der Wulp[10] had named an *Exoprosopa cingulata* from Australia, which name we had overlooked. It gives us pleasure, therefore, to rename this species *Exoprosopa painterorum*, new name, for our good friends, Dr. and Mrs. R. H. Painter.

10. Van der Wulp, Frederick M., Notes Leyden Mus., VII, 82, 1885.

A COLLECTION OF HERPTILES FROM URIQUE, CHIHUAHUA

Wilmer W. Tanner and W. Gerald Robison, Jr.[1]

The small mining town of Urique is located on the west bank of the Rio Urique, a branch of the Rio Fuerte, and is approximately twenty-five miles up stream from the Chihuahua-Sinaloa border. At Urique the elevation is approximately 1801 feet (549 meters as listed in Compendio Estadistico del Estado de Chihuahua, 1955-56, published by Ing. Leopoldo H. Olin). It is situated in a deep broad canyon which, from the rim (elevation on trail about 6700 feet), provides one with a magnificent view. In size the gorge of the Urique is comparable to the Grand Canyon of the Colorado, but differs in that there is considerably more vegetation on the slopes. To the north of the pueblo Urique the valley becomes gradually narrower, more rugged and steep walled, finally forming the now famous Barranca de Cobre.

Travel in this mountainous country is at best difficult. We were, however, fortunate in being able to use the new railroad grade for most of the way from Creel to Cuiteco and for some of the way from Cuiteco to Cerocahui. On the morning of July 14, 1958, Dr. and Mrs. Irving Knobloch, and the authors left Cerocahui by mule train for Urique. From Cerocahui to the rim of the Urique gorge we were in oak, madrone and pine forests. Our descent into the canyon took us through a number of plant types or zones. Near the rim were the Pine forests, then the Oaks, draped in bromeliads, below this a mixed forest including some species of Oak, Kapok, etc., and finally the short desert thorn and cacti forests on the lower slopes and valley floor. At Urique the valley is still rather narrow, the river flows rapidly, and there are few areas suited for crops.

Four days were spent (July 14-17, 1958) in and around Urique at the onset of the summer rains. Thus the days were hot and humid and with rain in the afternoon and evenings. The adverse weather plus the almost impenetrable thorn forest made collecting most difficult.

Although only fourteen species were taken, they represent a rather interesting group inasmuch as several are new state records and some are described below as new. We have followed the key and check lists of Smith and Taylor (1945,1948, and 1950) except as otherwise indicated. All measurements are in millimeters.

For the use of comparative materials and for identifications we are indebted to the following: Dr. Doris M. Cochran, United States National Museum (USNM); Dr. L. M. Klauber (LMK); Dr. John M. Legler, University of Kansas (KU); Dr. Hobart M. Smith, University of Illinois (UI); and Dr. Richard G. Zweifel, American Museum of Natural History (AMNH).

Bufo horribilis Weigmann—Although this species was abun-

1. Department of Zoology and Entomology, Brigham Young University, Provo, Utah, Contribution No. 170.

dant along the river and in the streets of the town, only ten were taken (BYU 14355-14354). Specimens ranged up to 125 from snout to vent and were similar in color pattern. The median dorsal stripe is distinct anteriorly and in some for the entire body. On each side there are irregular dark brown spots, the parotid glands are a dark rusty red, and the venter is unspotted. This is a range extension as well as a new record for Chihuahua.

Bufo m. mazatlanensis Taylor—This species was also abundant, principally in small pools along the river. Twelve (BYU 14343-54) were taken, all of which appear to be similar to specimens seen from five miles east of San Blas (BYU 14115-16, 14119-20) and seven miles south of Tuxpan on heights above Rio San Pedro (BYU 19421-3), Nayarit.

A comparison of the three series provides little variation. The occipital crests are present or absent in each series and the color pattern is nearly uniform throughout, except for the absence of the dorsal median stripe in two from Tuxpan. We find, as did Smith and Grant (Herpetologica 14:18), that the key characters (occipital crests) for both *nayaritensis* and *mazatlanensis* break down in these populations.

The finding of this species in Chihuahua is a new state record as well as a considerable range extension to the east.

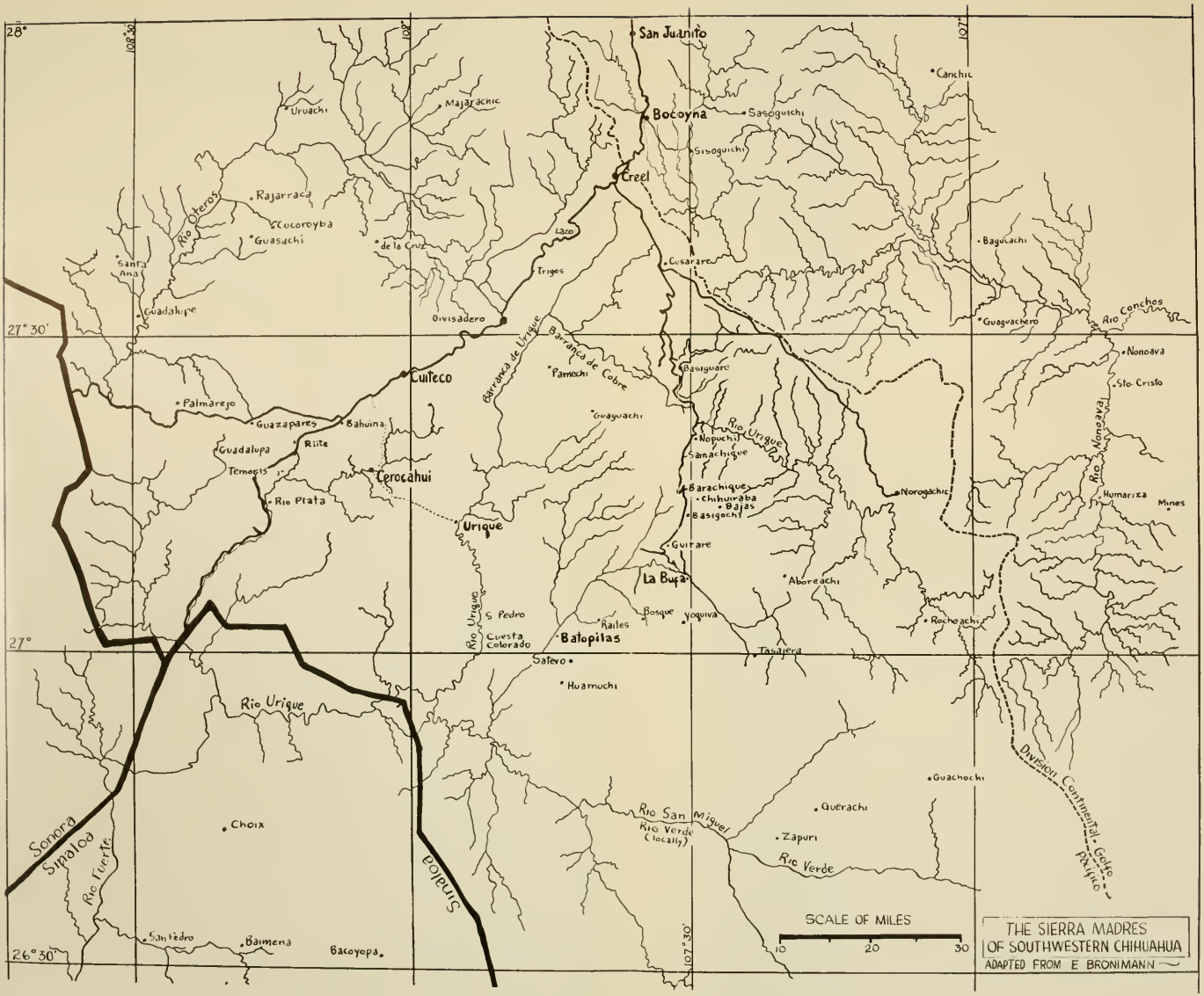
Bufo punctatus Baird and Girard—One (BYU 14341) was taken from beneath a rock on the hillside above the river. Although *punctatus* has been taken previously in Chihuahua, the published records are for localities east of the Continental divide.

Rana pipiens Schreber—A number were seen along the river. Two specimens (BYU 14365-6) were taken.

Anolis nebuloides Bocourt—Three specimens (BYU 14335-7) were taken from among low growing shrubs. All are adult females and possessed in life, a pale pink spot on the dewlap. They are similar to specimens (BYU 13915-16) taken 17 miles north of Mazatlan, Sinaloa, and (UI 41376-7) Puerto Vallarta, Jalisco, in that all have rugose head scales, enlarged dorsals and ventrals, and smaller less conspicuous supraocular plates. Perhaps both *nebulosus* and *nebuloides* occur in Chihuahua, however, these are *nebuloides* thus confirming its presence in Chihuahua.

Ctenosaura hemilopha (Cope)—A series of nine (BYU 14616-24) were taken from ledges and trees near town and from crevices in a rock wall surrounding an old cemetery. We found them to be a common species, although warry and difficult to secure.

In all there is a brownish-grey body color with three black blotches on the neck and shoulders. The first is small, the second large and with lateral extensions extending anteriorly nearly to the head, and enclosing the first. The posterior blotch forms a bar across the back and is the largest. A series of nine light cross bars, the anterior ones alternating with the black blotches, extend from between the first and second blotch posterior to base of tail. Near


San Juanito
Bocoyna
Creel
Uruachi
Majarachic
Sisoguichi
Sasoguichi
Canchic
Rajarraca
Cocoroyba
Guasachi
Rio Otero
Santa Ana
Guadalupe
de la Cruz
Lago
Triges
Cusarare
Bagucachi
Guagvachero
Rio Conchos
Divisadero
Barranca de Urique
Barranca de Cobre
Pamechi
Basiguare
Nonoava
Sto. Cristo
Rio Nonoava
Cuiteco
Palmarejo
Guazapares
Bahuina
Guadalupe
Riite
Temoris
Cerocahui
Rio Plata
Guaguachi
Nopuchi
Sanachique
Rio Urique
Barachique
Chihuiraba
Bajas
Basigochi
Norogachic
Humariza
Mines
Urique
Guitare
La Bufa
Aboreachi
Rocheachi
S. Pedro
Cuesta Colorado
Bopitas
Bosque
Yoquiva
Rails
Tasajera
Satevo
Huamuchi
Rio Urique
Guachochi
Querachi
Rio San Miguel
Rio Verde (Locally)
Zapuri
Rio Verde
Division Continental - Golfo Pacifico
Choix
Sonora
Sinaloa
Rio Fuerte
Sinaloa
San Pedro
Baimena
Bacoyopa
SCALE OF MILES
10
20
30
THE SIERRA MADRES OF SOUTHWESTERN CHIHUAHUA
ADAPTED FROM E BRONIMANN
28°
27° 30'
27°
26° 30'
108° 30'
108°
107°
107° 30'

midbody they consist of a row of light spots and anteriorly wider cross bands. Posterior to the third black blotch there is no indication of dark cross bands between the light bands, only a uniform brown body color occurs. On none did we observe green on the body, legs, or tail.

Variations in some of the scale patterns are as follows: Dorsal crest ranges from 83-104; these begin 7-9 rows posterior to enlarged head plates and terminate just anterior to hind legs, an area much more than three-fourths of body length. Between the posterior dorsal crest scales and the first enlarged scale of the caudal crest are 33-54 transverse rows. Those with the greater number of dorsal crest scales have fewer rows between the dorsal and tail crests. Ventrals range from 120-144; femoral pores 5-8; supralabials 10-12; infralabials 12-14; snout to vent range 138 to 200.

A specimen of *C. pectinata* (BYU 14143) taken 27 mi. S Acaponeta, Nayarit, has a greenish ground color, lacks the large shoulder blotches and has the dorsal crest reach the sacrum. The dorsal crest is separated from the caudal crest by seven rows of small scales. Although the dorsal crest extends farther posterior, the scales are larger and thus fewer (78) than in *C. hemilopha.*

Sceloporus clarki uriquensis subsp. n.

Type. —An adult male, BYU 14311, taken at Urique, Chihuahau, Mexico, July 16, 1958, by Wilmer W. Tanner and W. Gerald Robison, Jr.

Paratypes. —BYU 14310 and 14312, both topotypes.

Diagnosis. —A moderate to small form with the averages for the major scale counts, dorsals, ventrals, scales around body and femoral pores, falling between those of *clarki* and *boulengeri.* It is distinct from both in that the nasal is separated from the larilabials; there is only one scale between the subocular and labials at the middle of eye, postmentals are reduced to four, and there are only four supraoculars. The color pattern is distinct with a bright green head cap in males and a gray body without blue scales as in *clarki* or the dorsolateral stripes as in *boulengeri.*

Discription of Type. —Snout-vent 80.0; total length 182.5; snout-vent length approximately 45 per cent of total length.

Rostral broad, followed by four postrostrals; four internasals, lateral pair curving around nasal; a semicircle of three postnasals; seven frontonasals, first row with two large median and two small laterals immediately posterior to postnasals, second row of three; prefrontals in contact; frontal divided, anterior part twice size of posterior, posterior in broad contact with interparietal; parietals triangle shaped and smaller than interparietal; nasal round, separated from larilabials by lateral postrostral and subnasal; two canthals, first smallest; one loreal; one preocular; one subocular; three postoculars; five superciliaries, separated from supraoculars by a row of small scales; four supraoculars on left side, five on right

first three large supraoculars separated from median head scales by a row of small scales. From rostral to middle of eye, four supralabials and 5-6 infralabials; larilabials, a large scale alternating with two small scales; mental narrower but longer than rostral; outer row of postmentals 4-4 and separated from mental by half distance of first infralabial; inner row 4-5 and larger.

Gulars and ventrals smooth and notched; dorsals strongly

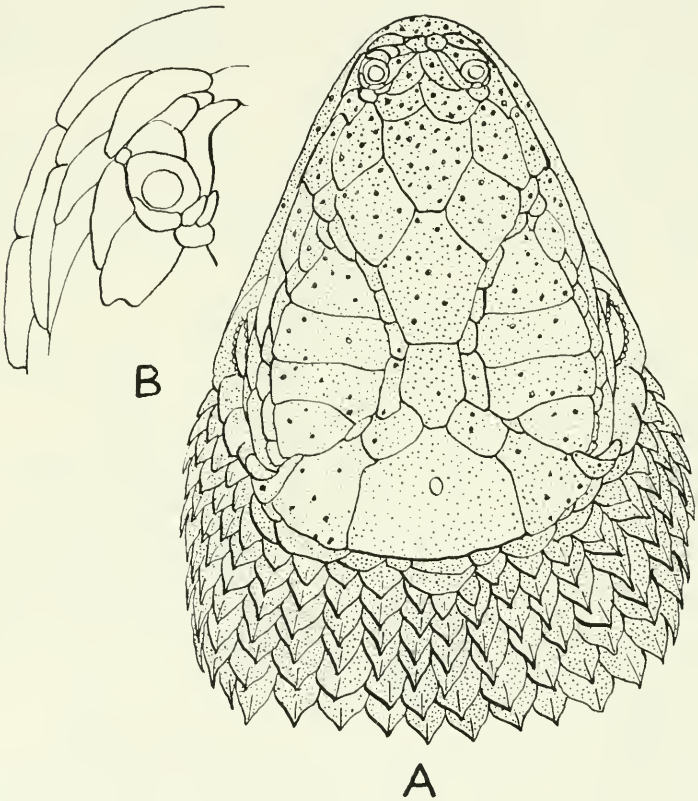


Fig. 1. Type specimen, *Sceloporus clarki uriquensis*. A. Dorsal head plates showing the four supraoculars. B. Scale arrangement around and below the nostral.

keeled and spined; scales around body 36; dorsals 30; ventrals 44; femoral pores 12-12; lamallae fourth toe 21-21.

Color and Color Pattern.—Dorsum grayish-brown, without spots or stripes; dorsal head scales approximating a uniform Sul-

phate Green (Ridgeway 1912); nuchal dark spots distinct anterior to shoulders, fading dorsally, margined posteriorly by a narrow incomplete light stripe; scales below ear and on posterior edge of shoulder spot with blue spots; dark shoulder spots narrowly separated ventrally by blue of gular spot; a single median bright blue gular spot, surrounded by black, except posteriorly; chin gray, stippled with fine dark spots; chest cream colored; abdomen with lateral patches of light blue, darker medially and separated narrowly by white; posterior half of tail faintly barred; forearm and hands with three light brown bars.

Range.—Known only from the type locality.

Remarks.—Several other specimens were seen but were so agile in the large trees that we had great difficulty even seeing them. The females are more drab colored and lack the bright green on the head scales. In contrast to the male there are four or five brownish chevron cross bands from nape to base of tail; the brown bands on tail are also distinct.

The two paratypes have only four large subequal supraocular plates. This is quite in contrast to the series of five large supraoculars observed in specimens of *clarki* and *boulengeri*. Although the anterior supraocular in the latter two forms is always smaller than the other scales, it is present and easily distinguished from the small adjoining circumorbitals. Other scales range as follows: rows around body, 36-38; dorsals, 29-30; ventrals, 40-45; femoral pores, 12-12.

Material.—(*S. c. clarki*). *Chihuahua*: Bavispe River, below Three Rivers, Sonora-Chihuahua line, BYU 13368-9, 13429, 13431-3, 13470, 13494-5, 13498, 13500-2, 13506, 13584-9, 13592; Colonia Juarez, BYU 13440-1; Red Rock, 12 mi. up Tinaja Canyon, BYU 13854. *Arizona*: 2 mi. W of Highway 92, Carr Canyon, BYU 13569.

(*S. c. boulengeri*). *Sonora*: Agiabampo, LMK 4069; Guirocoba, LMK 28390, 3, 4 and SDSNH 18299-33; 4 mi. N Navojoa, BYU 15179; 7 mi. SW of Alamos, SDSNH 18834-9. *Sinaloa*: Mazatlan, LMK 7337-41. *Nayarit*: Isabel Island, LMK 7332-4, 19125-9, 26780, 32931-3.

Sceloporus horridus albiventris Smith — A series of six specimens (BYU 14304-9) ranging from juveniles to adults were taken from a rocky brush area near the river and south of town. Adult males were conspicuous with their orange colored head cap, prominent dorsal spotting and dorsolateral stripes. Specimens seen in Nayarit (1956) were not so distinctly marked. The venter is with few marks and without blue. Femoral pores are seemingly increased over the coastal populations and range from 3-3 to 4-4.

This extends the range to the north and east, and is a new record for Chihuahua.

Sceloporus nelsoni coeruleus subsp. n.

Type. —An adult male, BYU 14316, taken at Urique, Chihuahua, Mexico, July 16, 1958, by Wilmer W. Tanner and W. Gerald Robison, Jr.

Paratypes. —BYU 14315, 14317-20, 14322-25, all topotypes.

Diagnosis.—Smaller than *nelsoni* and with tail compressed in both males and females. Dorsals increased, but with postrostrals usually decreased to three. Males with extensive deep blue from throat to hind legs. Adult females with considerable blue on abdo-

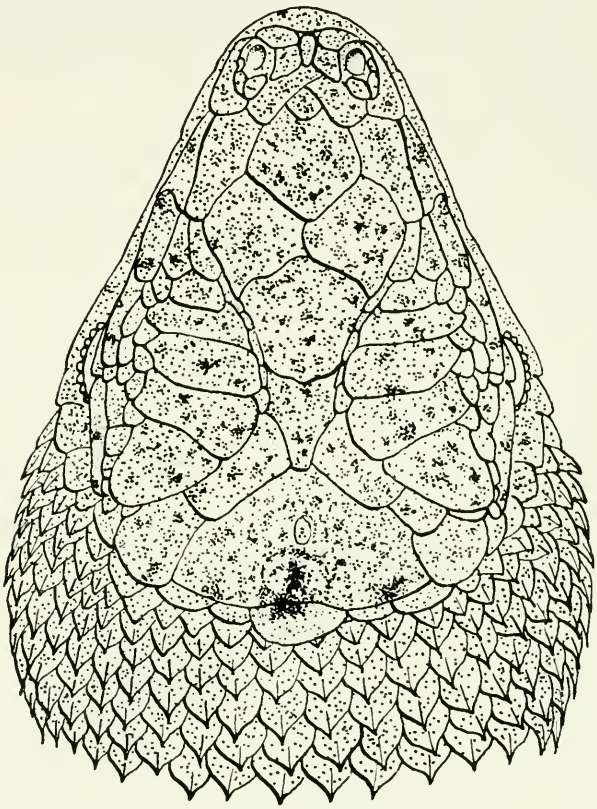


Fig. 2. Type specimen, *Sceloporus nelsoni coeruleus.* Dorsal head plates and color pattern.

men, margined medially by black. Dorsolateral stripes faint or obscure; labials, nape, shoulders and femors, with patches of orange, rather than the red or pink of *nelsoni.*

Discription of type. —Snout-vent 57; tail slightly compressed and with the tip regenerating.

Rostral broad, clearly visible from above, three postrostrals, median longer than wide and separating first pair of internasals, three scales in second row of internasals, median smallest; three

frontonasals, median largest; two large prefrontals, widely sutured medially; frontal divided, first section larger, second wedge-shaped and dividing frontoparietals; right frontoparietal divided, two undivided parietals; interparietal large, wider than long and followed by an enlarged median scute.

Nasal round, in broad contact with larilabials; a circle of three postnasals; two canthals, first larger; five supraoculars, first three separated from median head scales, all separated from superciliaries by a row of small scales; preocular divided; one large subocular, followed by two smaller postoculars; both sub and postoculars keeled. Four supralabials, separated from lateral head scales by two rows of larilabials; mental nearly as long as wide, followed by three pair of chin-shields, first pair in contact, second pair slightly smaller and separated by two small scales, third pair smallest; four infralabials, first much the largest, separated from chin-shields and gulars by outer row of postmentals.

Gulars and ventrals smooth and notched; dorsals 39; ventrals 48; scales around body 42; femoral pores 18-19; lamellae fourth toe 17-18.

Color and Color Pattern.—Dorsal scales brown with a bluish undertone, becoming darker laterally; dorsolateral stripe obscure; lateral head scales, shoulders and hind legs with patches or splashes of orange; abdomen, chest and throat with an extensive deep blue, a small pale blue spot on sternum surrounded by dark blue; gulars with scale rows of white and blue alternating spots, producing a checkered pattern; black shoulder spot present, extending as a narrow band across the throat area. A dorsal and three ventral light spots in margin of shoulder spot; latter extending onto front leg; one at point of shoulder largest.

Range.—Known only from the type locality.

Variations.—The type series is rather uniform but does show the following variations: Scales around body 41-45; dorsals 38-43, average 40.2; ventrals 42-48; femoral pores 17-19, average 18.3; postrostrals 3 or 4, more often 3; postnasals 2-4, average 2.84; frontoparietals divided in seven specimens, divided on one side in two and not divided in one. In first row of dorsals posterior to interparietal is a large medial scale, partly covered by black of parietal spot. Snout to vent length range from 51.5 to 57.5. In males the color pattern is uniform, as described for type. Females are variable, with smaller specimens having less pigment in the ventral pattern. Adult females have large ventral patches of blue edged medially with black and are similar in this regard to the males of *nelsoni*.

Material: (*S. n. nelsoni*) Type (USNM 47676); paratypes; USNM 18979, 47271, 47273-5, 47629 and 47690-1; and BYU 14383-4, 18 mi. S Acaponeta, Nayarit.

Urosaurus bicarinatus tuberculatus Schmidt—One adult male (BYU 14321) was taken from a ledge approximately one mile south of Urique. It is similar to specimens seen from northern Sinaloa, varying only in that the enlarged dorsals commence slightly poster-

ior to the anterior edge of the insertion of the front legs. The enlarged dorsals are equally rugose and some are mucronate. A female specimen (KU 47401) taken at La Bufa*, Chihuahua, is also similar to the *bicarinatus* specimens seen from Sinaloa. Batopilas, the type locality for *Urosaurus unicus* Mittleman, is not far from La Bufa or Urique and all three localities are in the same drainage system.

We have examined the type of *Urosaurus unicus* Mittleman (USNM 14248) and find it to resemble *bicarinatus* except for the more posterior position of the enlarged dorsals and the reduced rugoseness. The type appears to be an adult female. A second specimen seen by Mittleman (Smith & Mittleman, Kans. Acad. Sci. 46:246) is a juvenile.

Based on the data available for the four known specimens, there is considerable doubt as to whether *unicus* represents a distinct species. Except for the characters indicated above there are no significant differences in either scalation or color pattern. There is also a question as to whether it is a subspecies of *Urosaurus bicarinatus*, or a clinal variation in *b. tuberculatus*. Therefore, until sufficient material is available to make a final determination, we choose to include the Chihuahua specimens in *Urosaurus bicarinatus tuberculatus* Schmidt.

Cnemidorphorus sacki barrancorum Zweifel—Seven specimens (BYU 14326-43) were taken along the river and trails near Urique. This species is one of the commonest in the area.

Phrynosoma o. orbiculare Linnaeus—One specimen (BYU 14314) was taken on the west side of the canyon approximately three-fourths of the distance to the rim. It was in an opening at the lower edge of the pine belt.

Drymarchon corais rubidus Smith—A single adult (BYU 14245) was taken from near the river approximately one mile south of Urique. It was abroad when seen at 11:15 a.m.

The occurence of this species so far north is not surprising since the area is actually a continuation of the coastal plain-foothill habitat. It is a new record for Chihuahua.

The color pattern is a uniform black above and with a pale salmon colored venter. In scutellation it is similar to the series listed by Smith (1941:476). The important characteristics are as follows: A male, 1457 total length, with tail 275; ventrals 199; caudals 72; and infralabials 7-7.

Hypsiglena torquata subsp.—One adult male (BYU 14313) was taken approximately one mile west of Urique. The night snakes of Chihuahua are being considered in a subsequent study.

*A recently abandoned town on the Batopilas River and not to be confused with the mountain of the same name at Cusihuiriachi, Chihuahua.

Life History Notes on *Parabacillus coloradus* Scud.

On October 20, 1959, an adult female phasmid, *Parabacillus coloradus* Scud., was collected just a few yards north of the Brigham Young University stadium fence on a ragweed stem. It was reddish-brown, resembling the color of the stem, and was two and one-half inches in length.

After a few days in captivity it laid several black eggs the size of a rye kernel. The eggs were kept in a pint bottle until January 3, 1960, when the first of these hatched. The young phasmid, just a few hours after hatching, was one-half of an inch in length. This was quite surprising because of the small size of the egg. The body was yellowish-brown with a dorsal brownish-black strip running from the head to the caudal end. It appeared to be quite slow in its motions and often remained quiet in one place for a long time.

Comstock reports that in the common northern species *Diapheromera femorata* the eggs are dropped late i nthe summer and so do not hatch until the following spring, and that in some cases remain until the second spring before they hatch.

The eggs of this phasmid were laid on October 25, 1959, and just two and one-half months later they began to hatch. This was probably due to the warm conditions in which they were kept.

The young phasmid was kept alive in a terrestrial acquarium with a ragweed habitat. It lived for ten days in this environment before death.

—Wayne E. Saunders, Graduate Student in Entomology.

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